AuCom
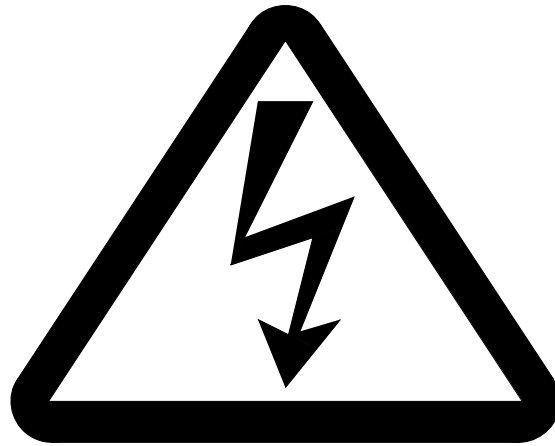
**AUCOSPEED CFI SERIES
COMPACT FREQUENCY INVERTER**

USERS MANUAL

SUPERIOR SOLUTIONS BY DESIGN

ELECTRONIC SOFT STARTERS AND A.C.SPEED DRIVES

WARNING

ELECTRICAL SHOCK HAZARD

**ENSURE THE DSC IS COMPLETELY
ISOLATED FROM THE POWER SUPPLY BEFORE
ATTEMPTING ANY WORK ON THE UNIT**

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CFI USERS MANUAL

THIS USERS MANUAL COVERS ALL CFI MODELS

To ensure trouble free installation and commissioning it is strongly recommended that users and installers read this Users Manual completely prior to installation and commissioning.

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SECTION 1   CAUTION STATEMENTS

Overview :   This section highlights potential causes of equipment damage

CAUTION

This caution symbol is used throughout the CFI Manual to draw special attention to activities which may result in equipment damage. A summary of these cautions is listed below.

Such Caution Statements cannot cover every potential cause of equipment damage but can highlight common causes of damage. It is therefore the installers responsibility to adhere to all instructions in this manual, to follow good electrical practice and to seek advice before operating this equipment in a manner other than as detailed in this manual.

- Ensure that the CFI is completely isolated from the power supply before attempting any work on the unit.

- Entry of metal swarf into the cabinet can cause equipment failure.

- Ensure the power supply is connect to the CFI Input Terminals [L1, L2, L3]. Application of voltage to the output terminals [U,V,W] will cause damage to the CFI power circuit.

- Ensure the CFI is properly earthed.

- Ensure the CFI has adequate ventilation

- Observe the CFI specifications

- The CFI DC Bus remains charged even if the power is off. Wait at least 10 minutes after removal of power before servicing the equipment.

- Do not switch on the output of the CFI while it is running.

- At low speeds motor cooling is severely restricted and motor overheating can occur at moderate loading. Thermistor protection should be used for motors which will operate at for extended period at a reduced speed while under load.

- Do not connect Power Factor Correction capacitors to the output of the CFI or the motor terminals.

The examples and diagrams in this manual are included solely for illustrative purposes. Users are cautioned that the information contained in this manual is subject to change at any time and without prior notice.

In no event will responsibility or liability be accepted for direct or indirect or consequential damages resulting from the use or application of this equipment.

SECTION 2   DEFINITIONS & DESCRIPTIONS

Overview : This section provides overview of terms used in this manual.

Abbreviations & Terminal Names

SYMBOL	DESCRIPTION	TYPE
ATN	Frequency Attained	Software Control Output
C SEL	Ramp Selection (Primary/Secondary)	Software Control Input
COM	Analogue Input Terminal Common	Analogue Input
EMS	Emergency Stop	Relay Input
F.JOG	Forward Inching	Software Control Input
F.RUN	Forward Run	Relay Input
FC,FA,FB	Relay Outputs	Relay Output
FDW	Frequency Down	Software Control Input
FLT	Trip (Fault)	Software Control Output
FSI	4-20mA Speed Signal Input	Analogue Input
Ftrq	Supply Frequency	
FSV	0-10VDC Speed Signal Input	Analogue Input
FUP	Frequency Up	Software Control Input
HOLD	Hold (Latch)	Software Control Input
I DET	Current Set Point [B26-1] Reached	Software Control Output
IFS	Use IFS Speed Signal	Software Control Input
MC	Precharging In Progress	Software Control Output
P10	10V Source For FSV	Analogue Output
PROG	Activate Multi-Step Function	Software Control Input
PSI1	Programmable Input 1	Relay Input
R.JOG	Reverse Inching	Software Control Input
R.RUN	Reverse Run	Software Control Input
RDY	Ready	Software Control Output
REV	Reverse	Software Control Output
RST	Fault Reset	Relay Input
RUN	Run	Software Control Output
S0, S1	Selector Switches For Multi-Step & Pattern Run	Software Control Input
SPD	Speed Set Points Reached	Software Control Output
VFS	Use FSV Speed Signal	Software Control Input

Software Control Input :   An internal input parameter which can be assigned to one of the DSC programmable Input Terminals, or permanently programmed to be ON or OFF.

Software Control Output :   An internal output parameter which can be assigned to one of the DSC programmable Output Terminals.

Parameter Overview

LED Display Parameters	
M0.	Output Frequency
M1.	Set Frequency
M2.	Output Current in Amps
M3.	Output Current in %
M4.	Overload Monitor
M5.	D.C.Bus Voltage
M6.	Output Voltage

Trip Log	
F0.	Most Recent Fault
F1.	Previous Fault

BLOCK A PARAMETERS

Frequency Settings		
A0.0	Run Speed	Standard Adjustment
A0.1		Fine Adjustment
A0.2	Jog Speed	Standard Adjustment
A0.3		Fine Adjustment
A0.4	Multi-Speed Step 0	Standard Adjustment
A0.5		Fine Adjustment
A0.6	Multi-Speed Step 1	Standard Adjustment
A0.7		Fine Adjustment
A0.8	Multi-Speed Step 2	Standard Adjustment
A0.9		Fine Adjustment
A0.A	Multi-Speed Step 3	Standard Adjustment
A0.b		Fine Adjustment
Acceleration/Deceleration Settings		
A1.0	Acceleration Rate (seconds)	
A1.1	Deceleration Rate (seconds)	
A1.2	Secondary Acceleration Rate	
A1.3	Secondary Deceleration Rate	
A1.4	Jog Acceleration Rate	
A1.5	Jog Deceleration Rate	
A1.6	Time Unit Multiplier	
Torque Boost & DC Brake Settings		
A2-0	Torque Boost (%)	
A2-1	Square-law Torque	
A2-2	Auto Torque Boost Gain	
A2-3	Slip Compensation Gain (%)	
A2-4	DC Brake Voltage	
A2-5	DC Brake Time	
A2-6	Start Frequency	
A2-7	Stop Frequency	
Skip Frequency Settings		
A3-0	Skip Frequency 1	
A3-1	Skip Band 1	
A3-2	Skip Frequency 2	
A3-3	Skip Band 2	
A3-4	Skip Frequency 3	
A3-5	Skip Band 3	
Ratio Interlock Settings		
A4-0	Polarity Of Coefficient (A)	
A4-1	Polarity Of Bias (B)	
A4-2	Coefficient (A) Value	
A4-3	Bias (B) Value	
A4-4	Maximum Speed	
A4-5	Minimum Speed	
Speed/Current Output Signal Settings		
A5-0	ATN Detect Band	
A5-1	IDET Current Detect Level	
A5-2	SPD Speed Detect Level	

BLOCK B PARAMETERS

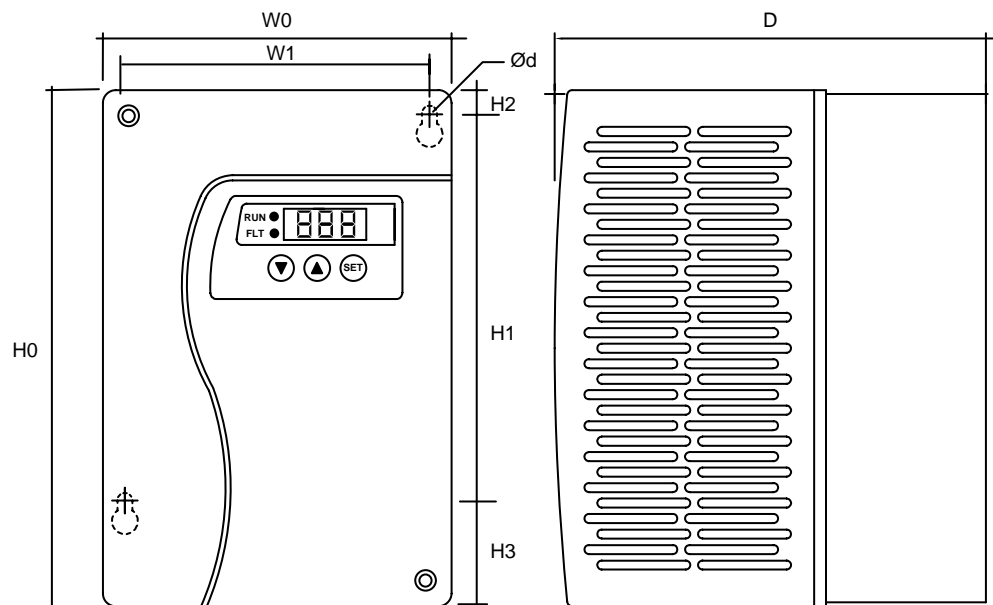| Overcurrent Limit Settings	
B3.0	Drive Current Limit
B3.1	Regenerative Capacity
Sundry Settings	
B4.0	Fault Reset
B4.1	Load Default Values
B4.2	Parameter Lock
Start Interlock Settings	
B5.0	Start/Stop Frequencies
B5.1	Start/Stop Frequency Hysterises
B5.2	Interlock Frequency
Control Format Settings	
B6.0	Run Command Format
B6.1	F RUN, R RUN Stop Format
B6.2	F JOG, R JOG Stop Format
B6.3	Autostart
B6.4	EMS Command Input Logic
B6.5	EMS Stop Format
Programmable Input Settings - 1	
B7.0	F RUN
B7.1	R RUN
B7.2	F JOG
B7.3	R JOG
B7.4	EMS
B7.5	RESET
B7.6	HOLD
B7.7	CSEL
Programmable Input Settings - 2	
B8.0	VFS
B8.1	IFS
B8.2	PROG
B8.3	S0
B8.4	S1
B8.5	FUP
B8.6	FDW
B8.7	FUP/FDW Step
B8.8	Relay Output Parameter Assign.
B8.9	LED Display Initialisation
Output Parameter Settings	
B9.0	Maximum Output Frequency Fmax
B9.1	Supply Frequency Ftrq
B9.2	Output Voltage
B9.3	Carrier Frequency
B9.4	Overload Setting
B9.5	0Hz Overload
B9.6	Input Voltage
B9.7	Preset Fmax/Ftrq Pattern

SECTION 3   PHYSICAL SPECIFICATION

Overview : This section details mounting instructions for the CFI Series Drives.

Dimensions (mm)

MODEL	Wo	W1	Ho	H1	H2	H3	D	Ød	Weight kg
CFI-2030	105	90	150	134	8	8	130	4.8	1.2
CFI-2042									
CFI-2080									
CFI-2011									
CFI-0025	135	118	200	150	9	41	167	5.8	2.4
CFI-0036									
CFI-0055									

**Mounting
Precautions**

Mount the CFI vertically
Do not mount in direct sunlight
Do not locate near heat radiating elements
Do not locate in area subject to corrosive or explosive gases
Allow clearance for ventilation
Do Not Obstruct Cooling Airflow

Installation
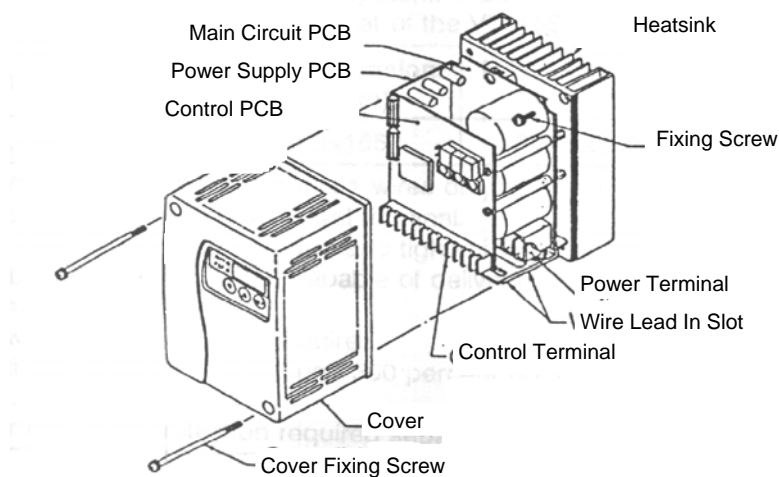
**Mounting In
Ventilated
Enclosures**

When mounting in a ventilated enclosure ensure there is at least a 50mm clearance around the sides, and 150mm above and below the CFI for adequate ventilation.
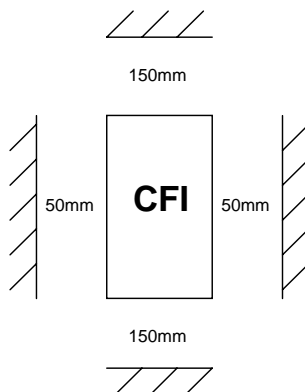
SECTION 4   ELECTRICAL CONNECTION (POWER CIRCUIT)

Overview : This section details the power circuit for CFI Series Drives.

**Connection
Procedure**   Connect the supply to the CFI power input terminals L1, L2 and L3, and the motor
to CFI output terminals U, V, W observing the following points :

1. Always earth the CFI

2. Always run the power cabling separately from control wiring to prevent electrical
   interference on control circuits.

3. Use neutral screened cable to prevent RFI. The screen must be earthed at both
   ends. Minimising the length of cable between the motor and inverter also acts to
   reduce RFI. Dedicated RFI filters are available for connection on the line side of
   the CFI if required.

⚠ CAUTION
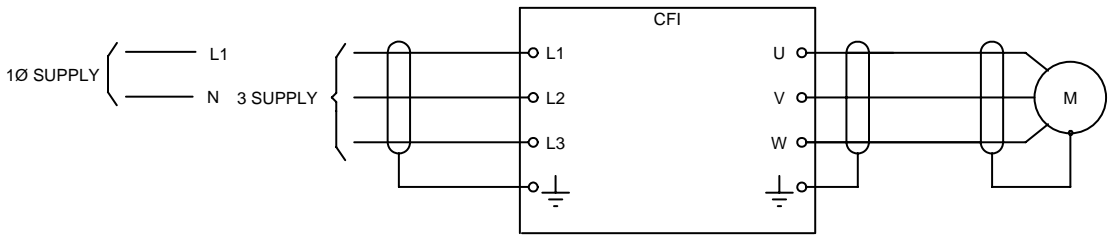
**Ensure the power supply is connected to the CFI Input Terminals [L1,
L2, L3]. Application of voltage to the output terminals [U,V,W] will
cause damage to the CFI power circuit.**

⚠ CAUTION

Do not switch on the output of the CFI while it is running.

⚠ CAUTION

**Do not connect Power Factor Correction capacitors to the output of
the CFI or the motor terminals.**

Dynamic Braking   CFI units supplied with Dynamic Brake circuitry may be fitted an external braking resistor to provide increased braking of the connected motor and load.
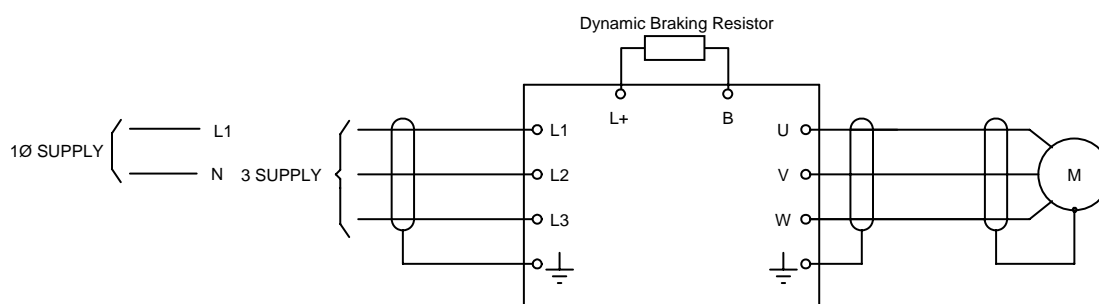
When using the dynamic Brake, set *Regen Capacity* [B3-1] for 30% or more.

Braking resistor should be selected according to the table below.

Model	Minimum Resistance Value (Ω)	100% torque 10%ED (60Sec/10min) Register	100% torque 5%ED (30Sec/10min) Register	100% torque 2.5%ED (15Sec/10min) Register
CFI-2080	80	400W 100Ω 1P	300W 100Ω 1P	300W 100Ω 1P
CFI-2110	50	300W 150Ω 2P	300W 150Ω 2P	300W 68Ω 1P
CFI-0025	200	300W 680Ω 1P	200W 680Ω 1P	200W 680Ω 1P
CFI-0036	200	300W 680Ω 2P	200W 680Ω 2P	300W 330Ω 1P
CFI-0055	200	300W 470Ω 2P	300W 470Ω 2P	200W 470Ω 2P

NOTES
1. P refers to parallel connection.
2. A maximum of 800V is applied to the DBR resistor. Resistor selection and wiring must be rated accordingly.

Supply
Conditioning   The CFI is suitable for direct connection to an AC supply. There are however certain abnormal supply conditions which can potentially cause drive input power componentry to fail. To reduce the possibility of damage a line reactor may be required. A line reactor should be considered where :
1. Power Factor correction capacitors are switched in and out on the supply to the drive.
2. The electrical supply is subject to frequent transient interruptions or significant voltage spikes.

SECTION 5   COMMISSIONING PROCEDURE

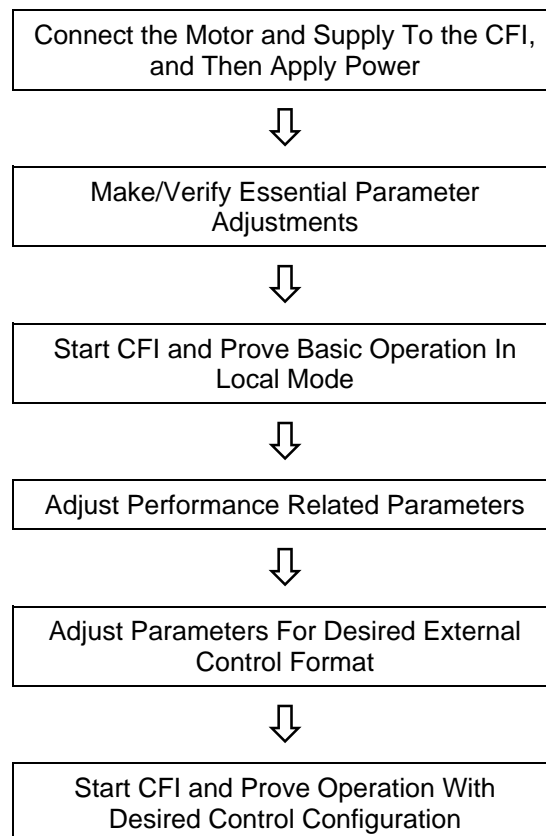**Overview :** This section details commissioning procedures for a CFI installation.

Overview

This section provides a step by step guide to commissioning the CFI in local control mode.

Having complete commissioning to this stage, users wishing to utilise any of the CFI's other control options or advanced features, can then refer to appropriate sections in this manual.

The basic steps followed in the commissioning procedure are :

Connect the Motor and Supply To the CFI, and Then Apply Power

⇩

Make/Verify Essential Parameter Adjustments

⇩

Start CFI and Prove Basic Operation In Local Mode

⇩

Adjust Performance Related Parameters

⇩

Adjust Parameters For Desired External Control Format

⇩

Start CFI and Prove Operation With Desired Control Configuration

STEP 1 | **POWER UP THE CFI** [Refer Section 4 For Electrical Connection Detail]

1. Connect the motor and supply to the CFI, and apply power to the CFI.

    The CFI will perform its power up checks and, when finished, the LED display will show ☐FF and the 'LCL' and Hz LEDs will illuminate.

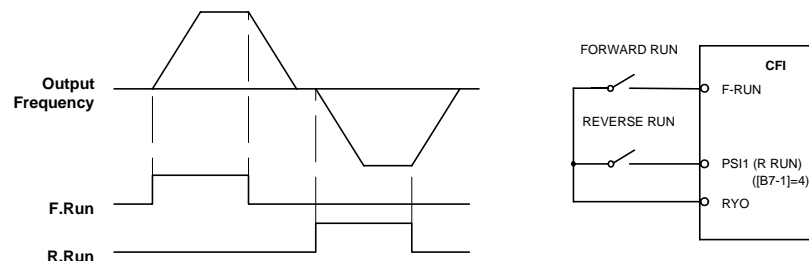**STEP 2** | **MAKE/VERIFY ESSENTIAL PARAMETER ADJUSTMENTS**
[Refer Section 8 For Programming Procedures]

1. Verify *Supply Voltage* [B9-6] and *Supply Frequency* [B9-1] are set correctly for the connected supply.

STEP 3 | **START THE CFI AND PROVE BASIC OPERATION**
[Refer Section 7 For Detail Of CFI Control Inputs]

1. **With power applied to the CFI, turn ON the F.RUN control input**.

    The LED display will change from ☐FF to display output frequency. The display will increase to ⌶⌶.⌶⌶. This is because the local *Run Speed* [A0-0] is set to 10Hz as the default. Check that :
    1. The motor runs smoothly
    2. The motor runs in the correct direction

2. **Turn OFF the F.RUN control input and stop the motor**.

3. **Turn ON the PSI1 (R.RUN) control input. The motor should run at 10Hz in reverse.**

4. **Turn OFF the R.RUN control input and stop the motor**.

5. **Turn ON the F.RUN control input. The motor should again run at 10Hz in the forward direction.**

6. **Adjust motor speed to 50Hz**

    Select Parameter *Run Speed* [A0-0] using the (▲) and (▼) keys. Press the (SET) key and then adjust motor speed using the (▲) and (▼) keys.

7. **Turn OFF the F.RUN control input when the speed reaches 50Hz**

    The LED Display will show ☐⊢ at the end of the stop, indicating operation of the DC Brake.

STEP 4

ADJUST PERFORMANCE RELATED PARAMETERS
[Refer Section 6 For Parameter/Function Detail]

The CFI offers an extensive function set to cater for a variety of application types. These features do not need to be set unless required. Adjustment of the most commonly used features is detailed below.

1. Adjust the *Acceleration Rate* [A1-0] to suit the load.

2. Adjust the *Deceleration rate* [A1-1] to suit the load.

3. The default maximum speed is set at 50Hz. If not appropriate adjust the *Maximum Frequency Setting* [B9-0].
    Note that the Maximum Frequency setting defaults to 50Hz each time the CFI is powered up unless this feature is over-ridden using the *Supply Voltage/Frequency Setting* [B9-7].

4. To utilise any other the CFI's other features refer to section 3 of this manual for features descriptions and adjustment detail.

STEP 5

ADJUST PARAMETERS FOR DESIRED EXTERNAL CONTROL FORMAT
[Refer Section 7 For CFI Control Options]

The CFI can be configured for a wide range of control formats. Section 7 of this manual details the options available.

STEP 6

RUN THE CFI AND PROVE OPERATION OF CONTROL CIRCUIT

Once the desired external control circuitry has been connected test its operation.
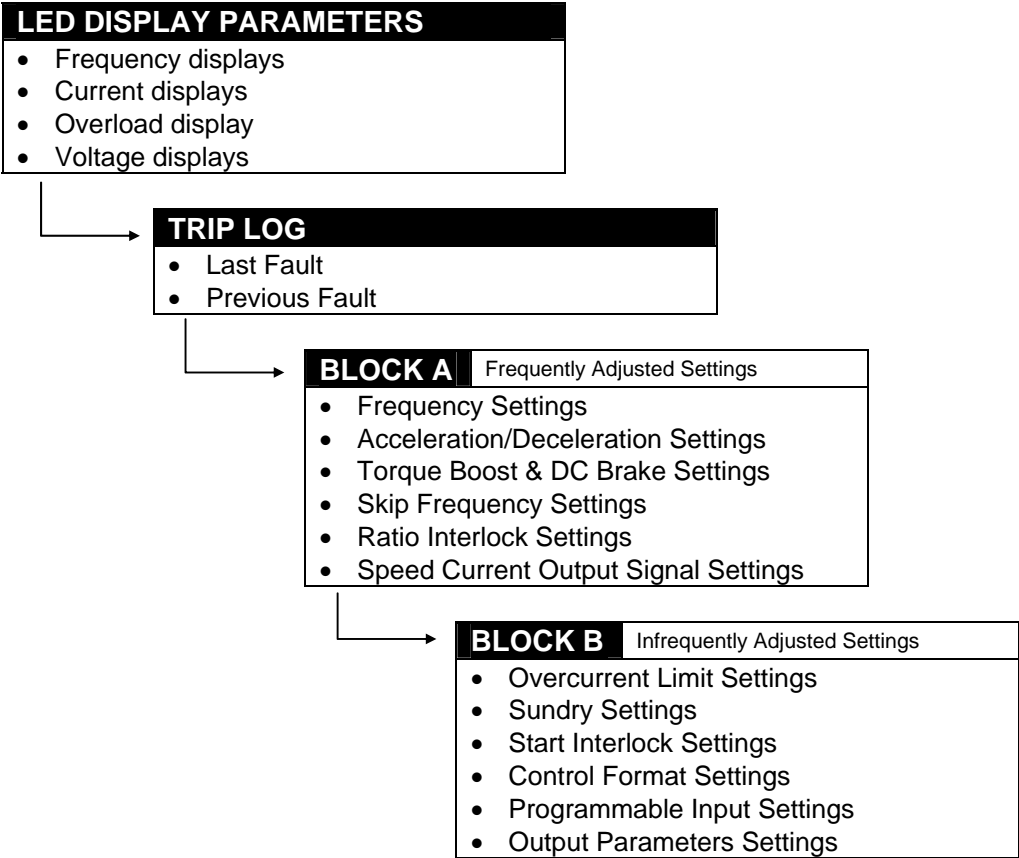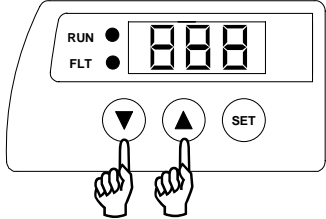
SECTION 6   CFI FEATURE DESCRIPTIONS

Overview :   This section describes the purpose and operation of each feature of the CFI Series Drives.

Overview   CFI features are grouped into four blocks as detailed below.

LED DISPLAY PARAMETERS
- Frequency displays
- Current displays
- Overload display
- Voltage displays

TRIP LOG
- Last Fault
- Previous Fault

BLOCK A   Frequently Adjusted Settings
- Frequency Settings
- Acceleration/Deceleration Settings
- Torque Boost & DC Brake Settings
- Skip Frequency Settings
- Ratio Interlock Settings
- Speed Current Output Signal Settings

BLOCK B   Infrequently Adjusted Settings
- Overcurrent Limit Settings
- Sundry Settings
- Start Interlock Settings
- Control Format Settings
- Programmable Input Settings
- Output Parameters Settings
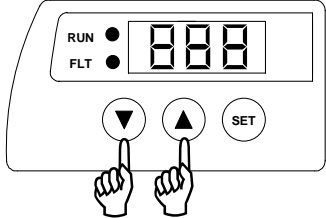
**LED Display
Parameters**

The CFI digital display can be used to view a variety of parameters. To scroll through the Display Parameter list do the following :

Scroll through the Display Parameter List.

Press the ▲ or ▼ keys to move to the desired display parameter (M0 thru M6). On releasing the key the value of the parameter will be displayed.

PARAMETER	NO	COMMENT
Output Frequency (Hz)	M0	"OFF" will display when the CFI output is shut off. "Br" will display when the DC Brake is operating.
Set Frequency (Hz)	M1	The frequency command currently being followed by the CFI is displayed.
Output Current (Amps)	M2	
Output Current (%)	M3	Output current is displayed as a percentage of CFI output rating. "Br" will display when the DC Brake is operating.
Overload Monitor (%)	M4	An overload trip occurs when this value reaches 100%
DC Bus Voltage (V)	M5	
Output Voltage (V)	M6	"OFF" will display when the CFI output is shut off.
Latest Fault	F0	Refer to the Trouble Shooting Section of this manual for
Previous Fault	F1	detail of fault codes.

TRIP LOG

The CFI provides a trip log which can show detail of the last two trip states :

Scroll through the Display Parameter List.

Press the ▲ or ▼ keys to move to the desired display parameter (F1 & F2). On releasing the key the fault code will be displayed

BLOCK A PARAMETERS

FREQUENCY SETTINGS				
PARAMETER		**NO**	**COMMENT**	**PAGE**
Run Speed	Standard Adjustment	A0-0	Adjusts Run Speed In 1Hz Increments	
	Fine Adjustment	A0-1	Adjusts Run Speed In 0.01Hz Increments	
Jog Speed	Standard Adjustment	A0-2	Adjusts Jog Speed In 1Hz Increments	
	Fine Adjustment	A0-3	Adjusts Jog Speed In 0.01Hz Increments	
Multi-Step Frequency Settings				
Step 0	Standard Adjustment	A0-4	Adjusts Step 0 Speed In 1Hz Increments	
	Fine Adjustment	A0-5	Adjusts Step 0 Speed In 0.01Hz Increments	
Step 1	Standard Adjustment	A0-6	Adjusts Step 1 Speed In 1Hz Increments	
	Fine Adjustment	A0-7	Adjusts Step 1 Speed In 0.01Hz Increments	
Step 2	Standard Adjustment	A0-8	Adjusts Step 2 Speed In 1Hz Increments	
	Fine Adjustment	A0-9	Adjusts Step 2 Speed In 0.01Hz Increments	
Step 3	Standard Adjustment	A0-A	Adjusts Step 3 Speed In 1Hz Increments	
	Fine Adjustment	A0-b	Adjusts Step 3 Speed In 0.01Hz Increments	
ACCELERATION/DECELERATION SETTINGS				
PARAMETER		**NO**	**COMMENT**	**PAGE**
Acceleration Rate (seconds)		A1-0	Primary Acceleration & Deceleration	
Deceleration Rate (seconds)		A1-1	Rates	
Secondary Acceleration Rate		A1-2	Alternate Acceleration & Deceleration	
Secondary Deceleration Rate		A1-3	Rates	
Jog Acceleration Rate		A1-4	Jog Acceleration & Deceleration	
Jog Deceleration Rate		A1-5	Rates	
Time Unit Multiplier		A1-6		
TORQUE BOOST & DC BRAKE SETTINGS				
PARAMETER		**NO**	**COMMENT**	**PAGE**
Torque Boost (%)		A2-0		
Square-law Torque		A2-1		
Auto Torque Boost Gain		A2-2	Torque Boost &	
Slip Compensation Gain (%)		A2-3	DC Brake Settings	
DC Brake Voltage		A2-4		
DC Brake Time		A2-5		
Start Frequency		A2-6		
Stop Frequency		A2-7		
SKIP FREQUENCY SETTINGS				
PARAMETER		**NO**	**COMMENT**	**PAGE**
Skip Frequency 1		A3-0		
Skip Band 1		A3-1	Frequency Settings	
Skip Frequency 2		A3-2	For Skip Frequency Function	
Skip Band 2		A3-3		
Skip Frequency 3		A3-4		
Skip Band 3		A3-5		

RATIO INTERLOCK SETTINGS			
PARAMETER	**NO**	**COMMENT**	**PAGE**
Polarity Of Coefficient (A)	A4-0		
Polarity Of Bias (B)	A4-1	Use For Conditioning Of Speed	
Coefficient (A) Value	A4-2	Input Signals. For example Span	
Bias (B) Value	A4-3	and Offset.	
Maximum Speed	A4-4		
Minimum Speed	A4-5		
SPEED/CURRENT OUTPUT SIGNAL SETTINGS			
PARAMETER	**NO**	**COMMENT**	**PAGE**
ATN Detect Band	A5-0	Set Points For Activation Of	
IDET Current Detect Level	A5-1	Speed and Current Reference	
SPD Speed Detect Level	A5-2	Outputs	

BLOCK B PARAMETERS

OVERCURRENT LIMIT SETTINGS			
PARAMETER	**NO**	**COMMENT**	**PAGE**
Drive Current Limit	B3-0		
Regenerative Capacity	B3-1		
SUNDRY SETTINGS			
PARAMETER	**NO**	**COMMENT**	**PAGE**
Fault Reset	B4-0		
Load Default Values	B4-1		
Parameter Lock	B4-2		
START INTERLOCK SETTINGS			
PARAMETER	**NO**	**COMMENT**	**PAGE**
Start/Stop Frequencies	B5-0		
Start/Stop Frequency Hysterises	B5-1		
Interlock Frequency	B5-2		

CONTROL FORMAT SETTINGS			
PARAMETER	**NO**	**COMMENT**	**PAGE**
Run Command Format	B6-0		
F RUN, R RUN Stop Format	B6-1		
F JOG, R JOG Stop Format	B6-2	Control Circuit Configuration Options	
Autostart	B6-3		
EMS Command Input Logic	B6-4		
EMS Stop Format	B6-5		

PROGRAMMABLE INPUT SETTINGS - 1			
PARAMETER	**NO**	**COMMENT**	**PAGE**
F RUN	B7-0	Programable Input Assignment	
R RUN	B7-1		
F JOG	B7-2		
R JOG	B7-3		
EMS	B7-4		
RESET	B7-5		
HOLD	B7-6		
CSEL	B7-7		
PROGRAMMABLE INPUT SETTINGS - 2			
PARAMETER	**NO**	**COMMENT**	**PAGE**
VFS	B8-0	Programable Input Assignment	
IFS	B8-1		
PROG	B8-2		
S0	B8-3		
S1	B8-4		
FUP	B8-5		
FDW	B8-6		
FUP/FDW Step	B8-7		
Relay Output Parameter Assign.	B8-8	Programable Output Assignment	
LED Display Initialisation	B8-9		
OUTPUT PARAMETER SETTINGS			
PARAMETER	**NO**	**COMMENT**	**PAGE**
Maximum Output Frequency Fmax	B9-0		
Supply Frequency Ftrq	B9-1		
Output Voltage	B9-2		
Carrier Frequency	B9-3		
Overload Setting	B9-4	Motor Overload Adjustment	
0Hz Overload	B9-5		
Input Voltage	B9-6		
Preset Fmax/Ftrq Pattern	B9-7		

FREQUENCY SETTINGS

Each CFI frequency setting parameter is shown in two parts. The first allows the setting to be made in 1.0Hz increments. The second allows fine adjustment in 0.01Hz increments.

for example : Run Speed can be set in 1Hz steps using parameter A0-0, while finer adjustments would be made using A0-1.

A0-0 Display   A0-1 Display
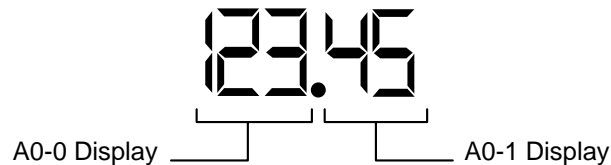
Run Speed

Standard Adjustment
Fine Adjustment

NUMBER	DEFAULT	MIN	MAX	UNIT
A0-0	1 0. 0 0	0.10	Fmax	Hz
A0-1				

Maximum Frequency
as set by the in parameter
B9-0

Jog Speed

Standard Adjustment
Fine Adjustment

NUMBER	DEFAULT	MIN	MAX	UNIT
A0-2	5. 0 0	0.10	Fmax	Hz
A0-3				

Sets motor speed when in jog mode.

Dedicated jog acceleration and deceleration times can be set using the *Jog Acceleration* and *Jog Deceleration* functions [A1-4 and A1-5.]

Multi-Step Frequency Settings

	NUMBER	DEFAULT	MIN	MAX	UNIT
Step 0 Standard Adjustment	A0-4	1 0. 0	0.10	Fmax	Hz
Fine Adjustment	A0-5				
Step 1 Standard Adjustment	A0-6	1 0. 0	0.10	Fmax	Hz
Fine Adjustment	A0-7				
Step 2 Standard Adjustment	A0-8	1 0. 0	0.10	Fmax	Hz
Fine Adjustment	A0-9				
Step 3 Standard Adjustment	A0-A	1 0. 0	0.10	Fmax	Hz
Fine Adjustment	A0-b				

These parameters specify the frequency set points for the Multi-Step Function. The Multi-Step function is activated by setting the **PROG** software control input [B8-2] to ON. The programmed frequency settings are selected using the S0 & S1 inputs as detailed below.

S0	S1	Selected Parameter
OFF	OFF	A0-4: Program Frequency - 0
OFF	ON	A0-6: Program Frequency -1
ON	OFF	A0-8: Program Frequency -2
ON	ON	A0-A: Program Frequency -3
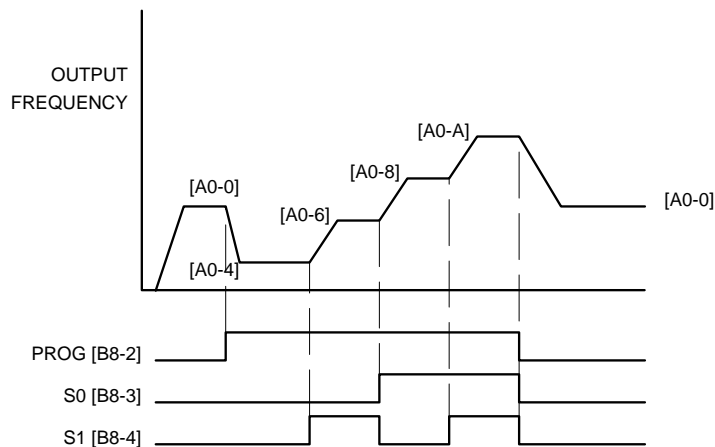
NOTE : F.RUN is ON, VFS and IFS are OFF

ACCELERATION SETTINGS

Acceleration Rate

NUMBER	DEFAULT	MIN	MAX	UNIT
A1-0	1 0. 0	0.1	99.9	Sec

Sets the rate of motor acceleration when the motor increases speed. The acceleration time can be further extended using the *Time Unit Multiplier* [A1-6].

Deceleration Rate

NUMBER	DEFAULT	MIN	MAX	UNIT
A1-1	2 0. 0	0.1	99.9	Sec

Sets the rate of motor deceleration when the motor decreases speed.
The deceleration time can be further extended using the *Time Unit Multiplier* [A1-6].
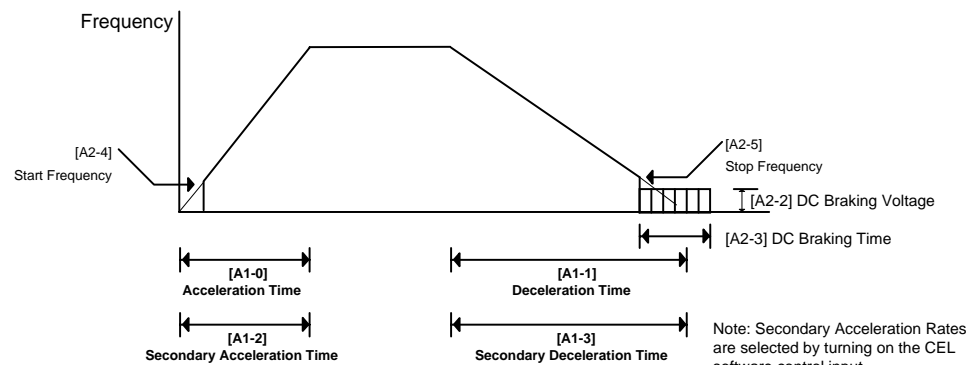
Secondary Acceleration Rate

NUMBER	DEFAULT			MIN	MAX	UNIT
A1-2		1	0.	0	0.1	99.9	Seconds

The secondary Acceleration and Deceleration Rates are activated by turning the **CSEL** Software Control Input [B7-7] ON.

Secondary Deceleration Rate

NUMBER	DEFAULT			MIN	MAX	UNIT
A1-3		2	0.	0	0.1	99.9	Seconds

Jog Acceleration Rate

NUMBER	DEFAULT			MIN	MAX	UNIT
A1-4			5.	0	0.1	99.9	Seconds

Jog Deceleration Rate

NUMBER	DEFAULT			MIN	MAX	UNIT
A1-5			5.	0	0.1	99.9	Seconds

Time Unit Multiplier

NUMBER	DEFAULT			MIN	MAX	UNIT
A1-6				1	1	100	

Acceleration and deceleration time settings can be modified by setting the Time Unit multiplier to a value greater than one. This setting affects all acceleration and deceleration time parameters. Acceleration and Deceleration settings can be increased to a maximum of 3600 seconds. Multiplication's exceeding 3600seconds will be automatically result in the maximum 3600 second setting.

TORQUE BOOST & D.C.BRAKE SETTINGS

Torque Boost

NUMBER	DEFAULT			MIN	MAX	UNIT
A2-0			3.	0	0.0	25	%

This figure sets the level of torque boost at 0Hz.

If the motor does not achieve breakaway torque slowly increase the value of this parameter until breakaway torque is achieved.

Voltage

[A2-0]

Supply Frequency [B9-1]
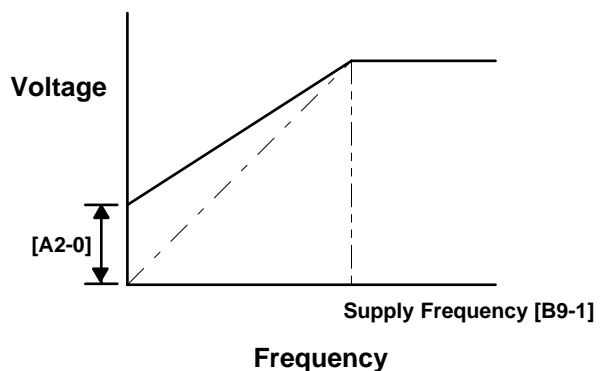
Frequency

Square-law Torque

NUMBER	DEFAULT		MIN	MAX	UNIT
A2-1		0. 0	0.0	25	%

This figure sets the voltage/frequency ratio for loads that follow a Square-Law torque characteristic. Use of this feature will result in increased efficiency.

The parameter sets the % of voltage reduction at half supply frequency. [B9-1 / 2]. Adjustment levels are determined by the load characteristics.
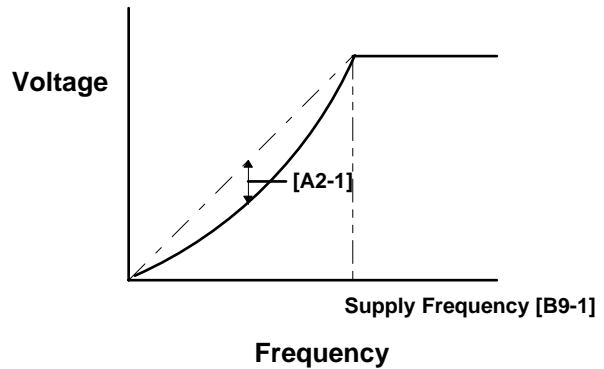
If both the *Torque Boost* [A2-0] and the *Square-Law Torque* [A2-1] parameters are set, the voltage/frequency ratio will reflect both settings.
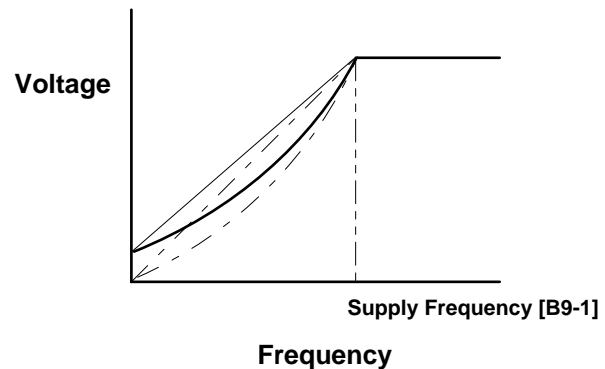
Auto Torque Boost Gain

NUMBER	DEFAULT		MIN	MAX	UNIT
A2-2		0. 0	0.0	20	%

Auto Torque Boost dynamically controls output voltage dependent upon motor loading. Thus optimum efficiency is automatically maintained at all times irrespective of motor loading.
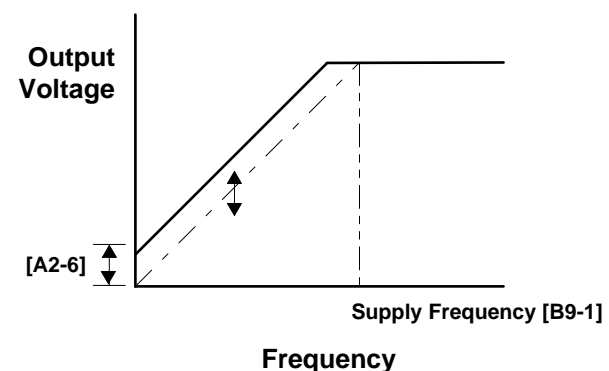
Notes :
1. This parameter over-rides *Torque Boost* [A2-0] and *Square-Law Torque* [A2-1]. To defeat Auto-Torque Boost set to zero ([A2-6] = 0).
2. Motor rotation may become unstable or the drive may trip if the setting is too high.

Slip Compensation

NUMBER	DEFAULT			MIN	MAX	UNIT
A2-3	0.	0	0	0.00	20.0	%

This parameter allows compensation for motor slip [%] at full load.

Output frequency is controlled according to motor load torque as shown in the graph.

Output Frequency

Load Torque

Motor rotation may become unstable if the setting is too high. The maximum setting should be no greater than the motors % slip at full load.
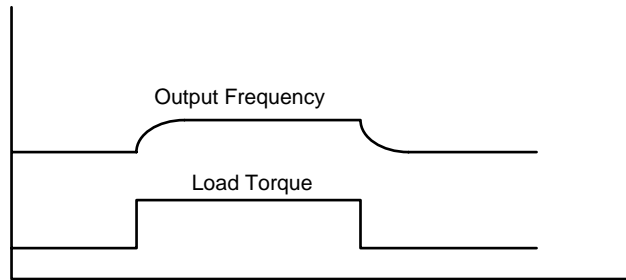
DC Brake Voltage

NUMBER	DEFAULT		MIN	MAX	UNIT
A2-4	5.	0	0.0	20.0	%
The default setting is model dependent.					

DC Brake Time

NUMBER	DEFAULT		MIN	MAX	UNIT
A2-5	2.	0	0.0	20.0	Seconds

The DC Brake allows the motor and load to be stopped more rapidly than with the coast to stop method. Alter the DC Brake in units of 1% or less at a time while monitoring the output current to ensure it does not exceed drive ratings. The D.C.Brake does not energise until the stop frequency is reached.

[A2-6]
Start Frequency

[A2-7]
Stop Frequency

[A2-4] DC Braking Voltage

[A2-5] DC Braking Time

[A1-0]
Acceleration Time

[A1-1]
Deceleration Time
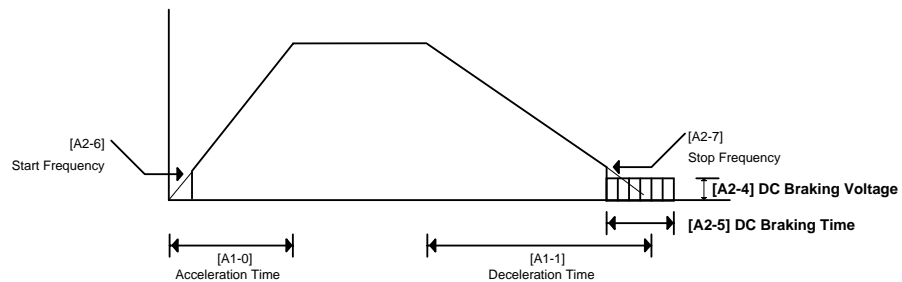
Start Frequency

NUMBER	DEFAULT		MIN	MAX	UNIT
A2-6	1.	0	0.1	60.0	Hz

Should a load not breakaway until the output frequency has increase to a level above 1Hz, this feature can be used to step to the required frequency straight away thus avoiding unnecessary motor heating. This setting should be made in 1Hz increments and set to the minimum possible level.

Stop Frequency

NUMBER	DEFAULT		MIN	MAX	UNIT
A2-7	1.	0	0.1	60.0	Hz
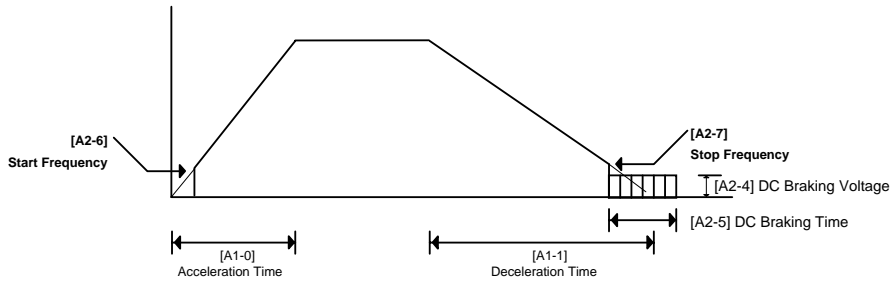
SKIP FREQUENCY SETTINGS

Skip Frequencies

	NUMBER	DEFAULT			MIN	MAX	UNIT
Skip Freq 1	A3-0			0	0	440.00	Hz
Skip Band 1	A3-1	0.	0		0.0	10.0	Hz
Skip Freq 2	A3-2			0	0	440.00	Hz
Skip Band 2	A3-3	0.	0		0.0	10.0	Hz
Skip Freq 3	A3-4			0	0	440.00	Hz
Skip Band 3	A3-5	0.	0		0.0	10.0	Hz

This feature allows mechanical resonance points to be avoided by skipping specified operating frequencies.
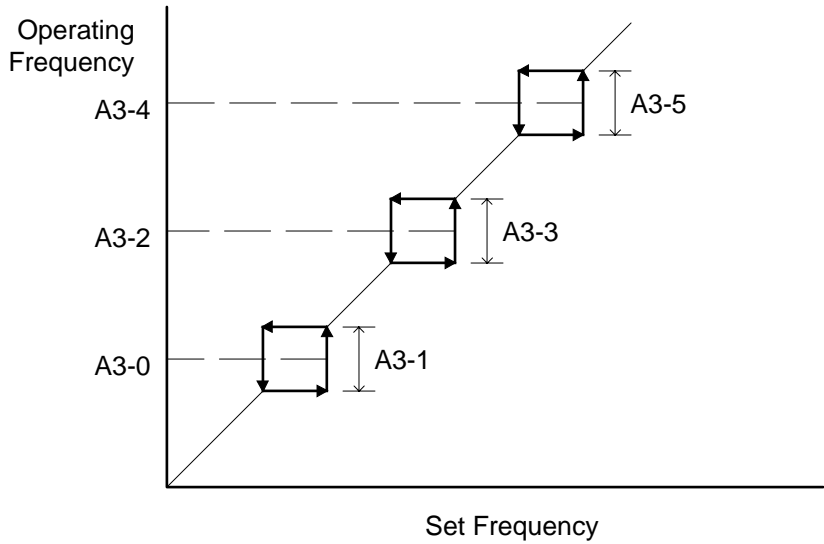
RATIO INTERLOCK SETTINGS

Ratio Interlock

NUMBER	DEFAULT			MIN	MAX	UNIT
Polarity Of Coefficient A — A4-0			1	1	2	1= Positive(+) 2= Negative(-)
Polarity Of Bias B — A4-1			1	1	2	1= Positive(+) 2= Negative(-)
Coefficient A Value — A4-2	1.	0	0	0.01	9.99	
Bias B Value — A4-3			0	0	440	Hz
Maximum Speed — A4-4	4	4	0	0	440	Hz
Minimum Speed — A4-5			0	0	440	Hz

This feature can be used to manipulate the speed input signal to achieve desired output frequency control. For example :
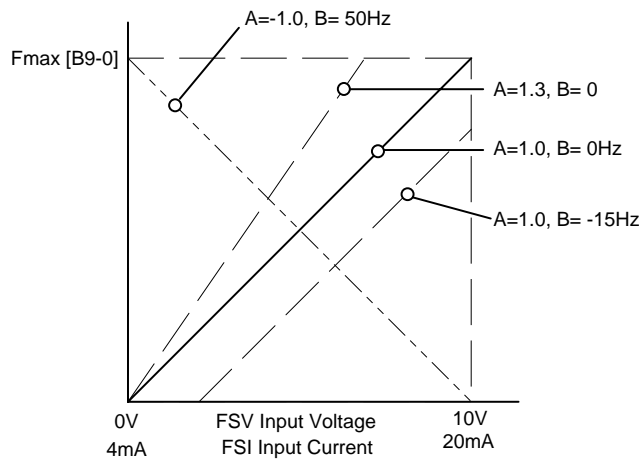
The Frequency Command (Y) is calculated according to the following formula.

$$Y = AX + B$$

Where :
X = Speed Signal Input
Y = Frequency Command Followed By CFI
A = Coefficient (A4-1)
B = Bias (A4-3)
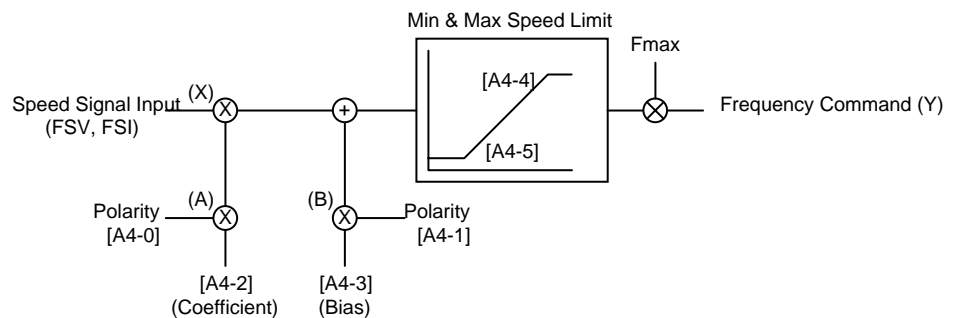
SPEED CURRENT OUTPUT SIGNAL SETTINGS

Speed Attainment
(Band Width)

NUMBER	DEFAULT			MIN	MAX	UNIT
A5-0		1.	0	0.0	20.0	%
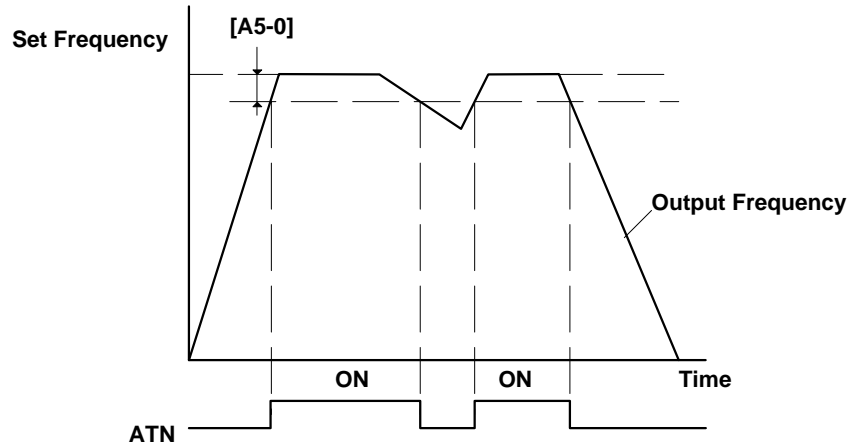
The speed attainment function provides indication that output frequency has reached the level called for by the speed signal. This parameter sets the band width for indication.

Current Detect
(Set Point)

NUMBER	DEFAULT			MIN	MAX	UNIT
A5-1		1	0	0.	5.	300	%
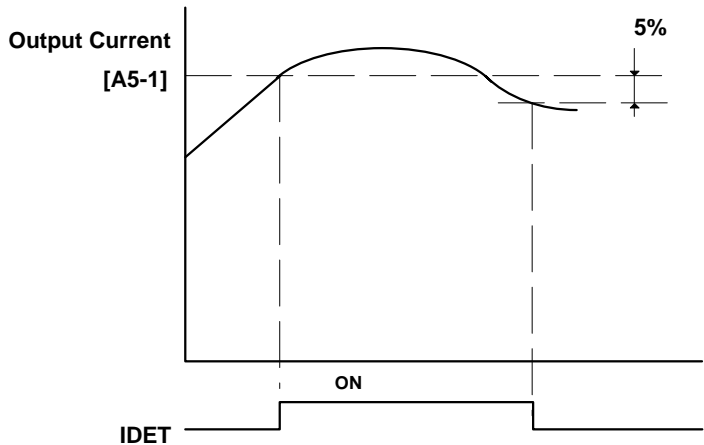
The *Current Detection* (IDET) Software Control Output provides indication that a preset current level has been reached. The *Current Detect Set Point* [A5-1] is set as a percentage of the rated current. The Current Detect Set Point has a 5% hysterises.

Speed Detect
(Set Point)

NUMBER	DEFAULT			MIN	MAX	UNIT
A5-2	9	5.	0	1.0	105.0	%

The *Speed Detect* Software Control Output provides indication of attainment of a user adjustable speed set point. The setting is made as a percentage of *Maximum Output Frequency* [B9-0]. The Speed Detect set points have a 1% hysteresis.
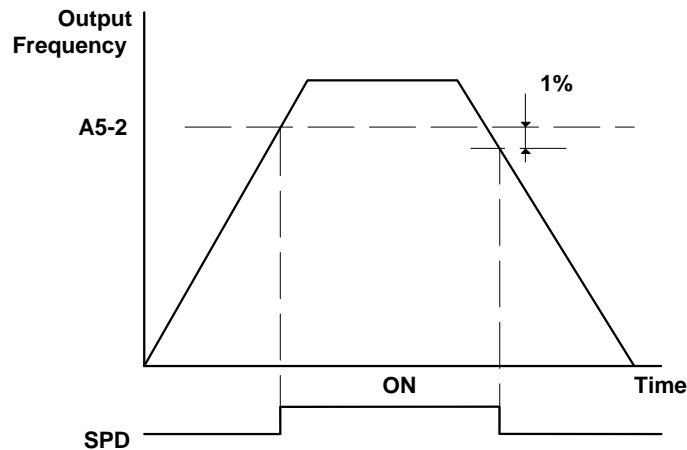
OVERCURRENT LIMIT SETTINGS

Drive Current Limit

NUMBER	DEFAULT			MIN	MAX	UNIT
B3-0	1	5	0	50.	300.	%

The CFI output current is limited by lowering the output frequency so that it does not exceed the *Drive Current Limit* [B3-0]. Drive Current Limit is set as a percentage of CFI rated current.

Be sure to set a value higher than the motor's no load current.

Regen Capacity

NUMBER	DEFAULT			MIN	MAX	UNIT
B3-1			2	0	10	300	%

The CFI will act to limit the energy regenerated during deceleration. The Regen Capacity should be set to 20% unless using the dynamic brake option.

When using the dynamic brake option the Regen Capacity should be set using the following formula. Note that a minimum setting of 30% must be used when a DBR is connected.

$$B3\text{-}1 = \left[\left(\frac{593}{\text{DBR Resistance Value}} \right) / \text{Motor Capacity [kW]} \right] \times 100\%$$

SUNDRY SETTINGS

Fault Reset

NUMBER	DEFAULT			MIN	MAX	UNIT
B4-0			0	0	255	9 = Reset Fault and Clear Trip Log 1 = Reset Fault but <u>not</u> Trip Log

Load Default Values

NUMBER	DEFAULT			MIN	MAX	UNIT
B4-1			0	0	255	

  9 = Load Block A default values
19 = Load all default values

Parameter & Operation Locks

NUMBER	DEFAULT			MIN	MAX	UNIT
B4-2			0	0	255	

37 = only A0-x settings can be changed
54 = All parameters can be changed

START INTERLOCK SETTINGS

Start Interlock

	NUMBER	DEFAULT			MIN	MAX	UNIT
Start/Stop Frequencies	B5-0		0.	0	0.0	20.0	Hz
Start/Stop Freq. Hysterises	B5-1		0.	0	0.0	20.0	Hz
Interlock Frequency	B5-2		0.	0	0.0	20.0	Hz

Start/Stop Frequencies : The motor will run when the frequency setting is higher than the [B5-0] setting, and will stop when lower. (Note : normally when the frequency setting is 0, the motor will not stop completely because the output frequency will be limited to a minimum of 0.1Hz. Parameter [B5-0] can be used to stop the motor completely if required.)

Interlock Frequency : If the speed input signal is higher than the [B5-2] setting when the run command is given, the motor will not start. This function is useful for situations where the initial operating speed must be low for safety reasons.

Notes
1. Start/Stop Frequency [B5-0] and Interlock Frequency [B5-2] functions cannot be used simultaneously. Ensure at least one of these settings is 0.
2. Start/Stop Frequency [B5-0] and Start/Stop freq. Hysterises [B5-1] will not function during jog.
3. When Start/Stop Frequency [B5-0] and Start/Stop freq. Hysterises [B5-1] are used, the RUN lamp will flicker.

CONTROL FORMAT SETTINGS

Run Command Format

NUMBER	DEFAULT			MIN	MAX	UNIT
B6-0			1	1	3	

1 = F.Run, R.Run
2 = Run, Reverse
3 = Push Button Control

1 = F.Run, R.Run
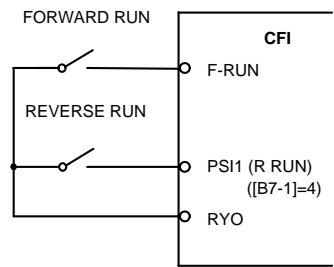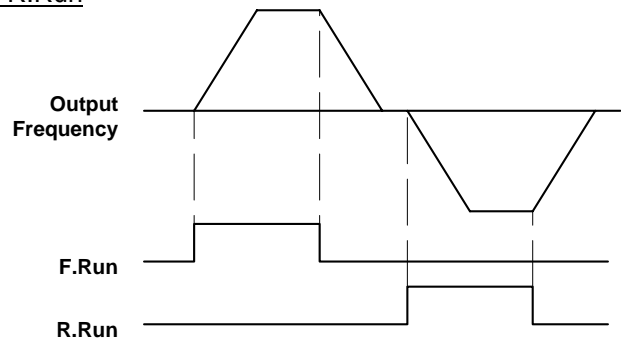
2 = Run, Reverse
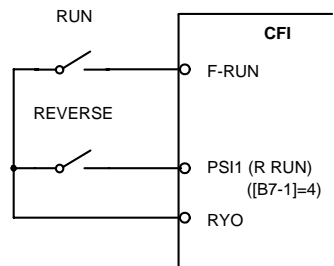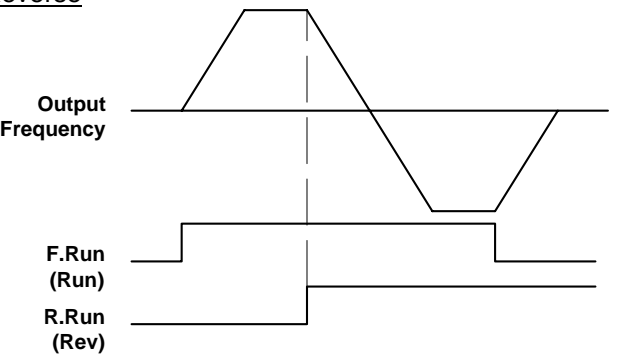
3 = Push Button Control
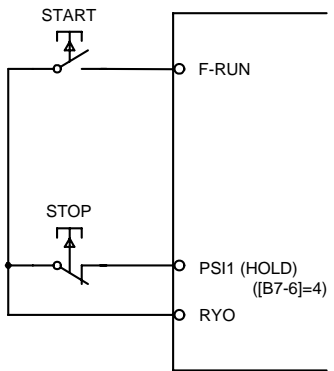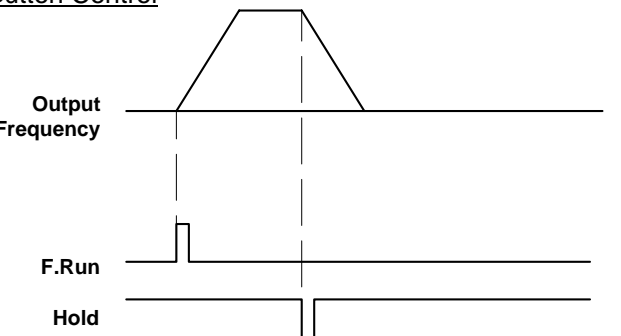
F Run, R Run Stop Format

NUMBER	DEFAULT				MIN	MAX	UNIT
B6-1				2	1	2	

1 = Coast to stop
2 = Decelerate to stop
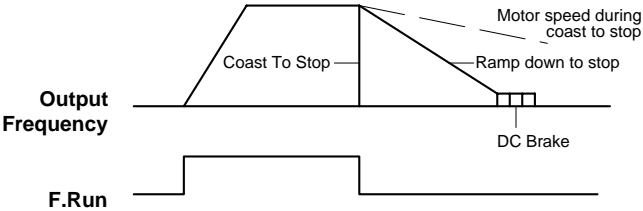
F Jog, R Jog Stop Format

NUMBER	DEFAULT				MIN	MAX	UNIT
B6-2				2	1	2	

1 = Coast to stop
2 = Decelerate to stop

Auto Start

NUMBER	DEFAULT				MIN	MAX	UNIT
B6-3				1	1	3	

1 = Off
2 = On - CFI will run the motor when power is applied to the CFI
3 = Restart On - In the event of a power failure, the CFI will automatically run the motor when power is turned back on.

1= OFF : CFI begins to run the motor when the Run signal is given

2= ON : If the Run command is on when power is applied to the CFI, the motor will begin to run as soon as the CFI soft charge period is complete.
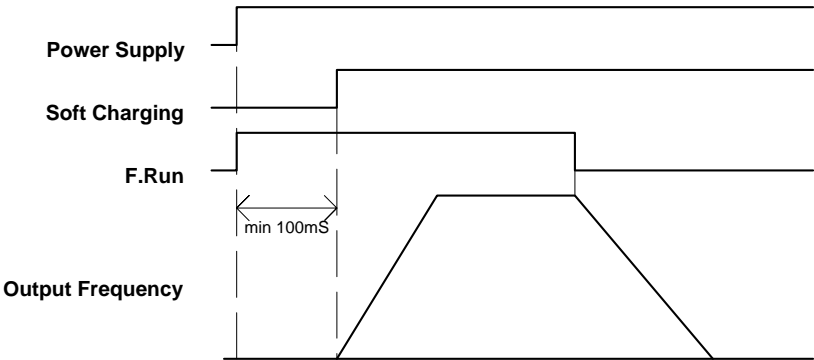
3= RESTART : This causes the CFI to automatically restart after a power
supply interuption. If the Run command is on when power is re-applied to
the CFI, the CFI will begin to run the motor following completion of the soft
charge period.

Power Supply

Soft Charging

F.Run

min 100mS

Output Frequency   Motor Speed

Motor Speed Search
4 Sec
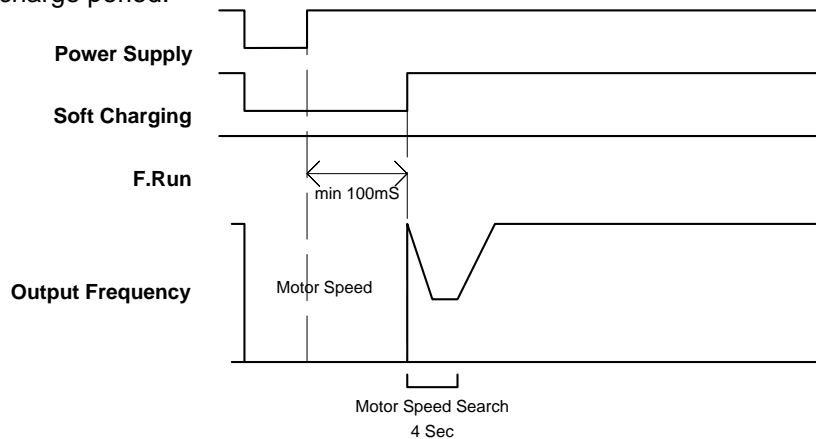
Emergency Stop
Input Logic

NUMBER	DEFAULT	MIN	MAX	UNIT
B6-4	1	1	2	

1= Close To Stop (Normally Open)
2= Open To Stop (Normally Closed)

Emergency Stop
Format

NUMBER	DEFAULT	MIN	MAX	UNIT
B6-5	1	1	3	

1= Coast To Stop without a fault output
2= Coast To Stop with a fault output
3= Ramp Down To Stop without a fault output

CONTROL FORMAT SETTINGS

Programmable
Input Configuration

	NUMBER	DEFAULT	MIN	MAX	UNIT
F.RUN	B7-0	3	0	9	
R.RUN	B7-1	4	0	9	
F.JOG	B7-2	0	0	9	
R.JOG	B7-3	0	0	9	
EMS	B7-4	1	0	9	
RESET	B7-5	2	0	9	
HOLD	B7-6	0	0	9	
CSEL	B7-7	0	0	9	
VFS	B8-0	0	0	9	
IFS	B8-1	0	0	9	
PROG	B8-2	0	0	9	
S0	B8-3	0	0	9	
S1	B8-4	0	0	9	
FUP	B8-5	0	0	9	
FDW	B8-6	0	0	9	

Value	Input Terminal or State
0	OFF
1	EMS
2	RST
3	F RUN
4	PSI1
9	ON

Refer Section 7 : Control Inputs for description of Input Functions

These parameters set Software Control Inputs to ON or OFF, or links the Software Control Input to the state of one of the CFI's Control Input Terminals.

FUP/FDW Step

NUMBER	DEFAULT			MIN	MAX	UNIT
B8-7	0.	1	0	0.01	2.00	Hz

This parameter sets the value of the speed increment or decrement for a single activation of the FUP or FDW inputs. The speed change will continuously increment or decrement when the FUP or FDW inputs are turned on for 3 seconds or more.
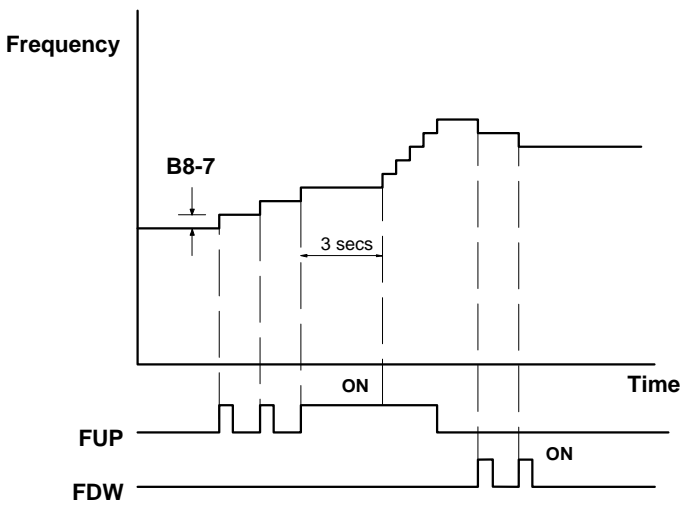
**Relay Output
Parameter Assign.**

NUMBER	DEFAULT			MIN	MAX	UNIT
B8-8			1	0	7	

0 = Run (RUN)
1 = Fault (FLT)
2 = Soft Charging (MC)
3 = Ready (RDY)
4 = Reverse (REV)
5 = Current Set Point Reached (IDET
6 = Frequency Attained (ATN)
7 = Speed Set Point 1 Reached (SPD)

**LED Display
Initialisation**

NUMBER	DEFAULT			MIN	MAX	UNIT
B8-9			0	0	6	

This parameter specifies the number of the display parameter to appear on the LED Display when power is turned on.

OUTPUT PARAMETER SETTINGS

Maximum Output Frequency

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-0	5	0.	0	3.0	440.0	Hz

This parameter is automatically set according to the value entered in *Preset Fmax/Ftrq Patter* [B9-7] unless B9-7 is set to 0. If B9-7 is not set to 0 this adjustment will be reset according to the B9-7 setting when power is removed from and reapplied to the CFI.

Supply Frequency

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-1		5	0	0	440.0	Hz

This parameter is automatically set according to the value entered in *Preset Fmax/Ftrq Patter* [B9-7] unless B9-7 is set to 0.

Output Voltage

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-2	4	0	0.	0.	460.	V

If this parameter is set at 0, output voltage will equal input voltage when output frequency equals the supply frequency. If set at a value greater than 0, the AVR function is activated so that the output voltage will equal the set value at the supply frequency.

Carrier Frequency

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-3		1	2.	3.	12.	kHz

Adjustment of the carrier frequency effects motor noise.

Overload Setting
Overload Setting (Full Speed)

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-4	1	0	0.	20.	105.	%

The characteristics of the Inverse Time Motor overload may be changed using this parameter. The overload setting is made as a percentage of inverter rating.
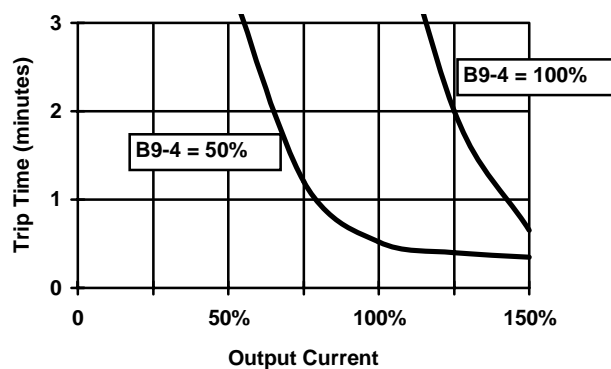
0Hz Overload
Overload Setting (0 Hz)

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-5	1	0	0.	10.	105.	%

When running self cooling motors at a low speed motor cooling is reduced. This parameter reduces the tripping time to cater for reduced motor cooling.

**Overload
Reference**

Ftrq x 0.7   Ftrq
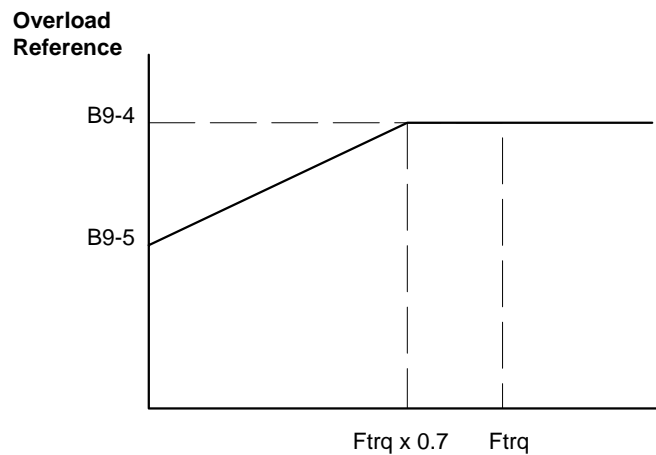
Note :   At 0.5Hz or less, the CFI will trip at 75% of the rated current in one minute. If the CFI output current exceeds 155%, the inverter will trip at 170% of the rated current in 2.5 seconds.

Input Voltage

.

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-6			2	1	5	

	230V MODELS	**400V MODELS**
1 =	190V	380V
2 =	200V	400V
3 =	220V	415V
4 =	230V	440V
5 =	240V	460V

When this parameter is changed, the value of B9-2 (Output Voltage) will also be automatically updated to the same value.

**Preset Fmax/Ftrq
Pattern**

NUMBER	DEFAULT			MIN	MAX	UNIT
B9-7			1	0	9	-

	Supply Freq. [Hz]	**Max Output Freq. [Hz]**
0 =	Random Setting with B9-1	Random Setting with B9-0
1 =	50	50
2 =	60	60
3 =	50	60
4 =	50	75
5 =	50	100
6 =	60	70
7 =	60	80
8 =	60	90
9 =	60	120

Preset Supply and Maximum Output Frequency settings can be selected using this parameter, which when set automatically changes the value of parameters B9-0 and B9-1. If a suitable preset setting is not available random settings can be made using B9-0 and B9-1.

SECTION 7   ELECTRICAL CONNECTION (CONTROL CIRCUIT)

Overview : This describes the CFI's various control inputs and outputs.

Input / Output Terminals Overview

The CFI Series drives provide three types of control input and output terminations.

1. Switched Inputs
2. Analogue Inputs
3. Switched Outputs
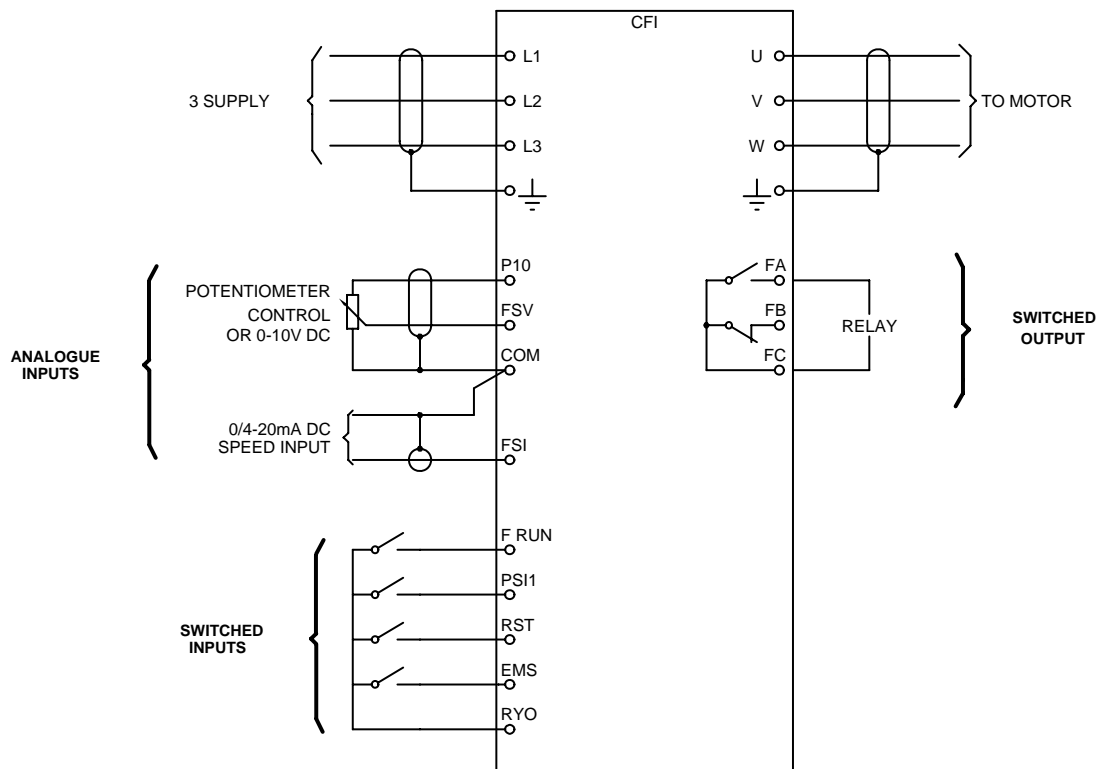
Switched Inputs   The CFI provides four programmable switched inputs, F.Run, RST, EMS & PSI1. All four inputs are programmable, with the first three assigned to

LABEL	DESCRIPTION	TYPE
F.RUN	Run (default setting)	
RST	Resets the CFI after a trip condition (default setting)	
EMS	Emergency Stop (default setting) Initiate an emergency stop in the manner programmed in the ***Emergency Stop Format*** parameter [B6-4]. If already stop, the activation of the EMS input will prevent CFI operation. The EMS input may be programmed to be normally open or normally closed.	Programmable (note 1 & 2)
PSI1	Programmable Relay Input Terminal 1.	
RYO	Relay Input Common for switched inputs.	Fixed

1. See Software Input/Output Overview later in this manual for available functions.
2. Refer to the ***Programmable Input Configuration Parameters*** [B7-0 thru B8-6] description in section 3 of this manual for programming procedures.

The inputs terminals are positioned on the main control terminal block as shown below.

RYO	PSI1	FRUN	RST	EMS	P10	FSV	FSI	COM	FC	FB	FA

Specification :

- active 24 VDC
- operate with a potential free circuit
- contacts used for controlling these inputs should be low voltage, low current rated. (Gold Flash or similar)
- control wiring should be run separately from power wiring and should not exceed 50m in length.
- allowable leakage current 0.5mA

Analogue Inputs   The CFI provides three analogue inputs for connection of remote speed signals.

LABEL	DESCRIPTION
FSV	Potentiometer Speed Reference Input.
	This is a 0-10VDC speed reference input with analogue output terminal P10 providing the 10V source for the circuit.
FSI	4-20mA speed reference input.
COM	Common for FSV and FSI

The analogue inputs terminals are positioned on the main control terminal block as shown below.

RYO	PSI1	FRUN	RST	EMS	P10	FSV	FSI	COM	FC	FB	FA

Typical Potentiometer Control Configuration
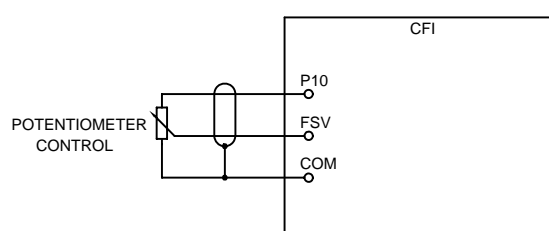
NOTE : The VFS software control input must be turned ON to activate the potentiometer control option ([B8-0]=9)

Typical 0-10VDC Control Signal Configuration
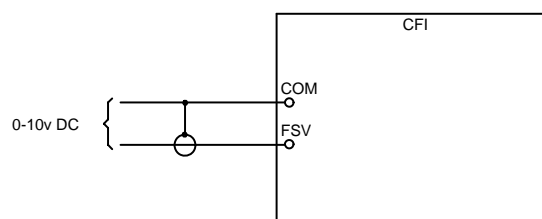
NOTES :
1. The VFS software control input must be turned ON to activate the 0-10VDC control ([B8-0]=9)

Typical 4-20mA Control Signal Configuration
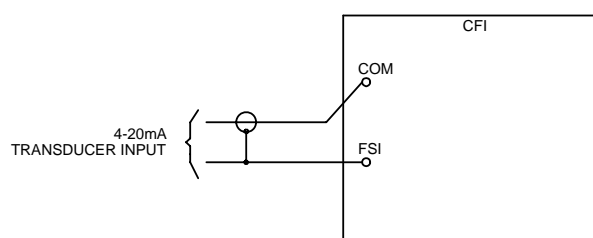
NOTE : The IFS software control input must be turned ON to activate the 4-20mA control option ([B8-1]=9)

IMPORTANT : If multiple speed control inputs are connected, and the corresponding Software Control Inputs are also ON, the speed reference signal is selected with the following priority :

PROG > IFS > VFS.

[Multi-Step] > [Current] > [Voltage]

Specification :

- use 2kΩ/2W rated potentiometer.
- the maximum input rating for FSV is - 0.0 to + 10.5V
- control wiring should be run separately from power wiring and should not exceed 30 meters.
- use shielded cable for analogue control inputs. The shield should be connected to the COM terminal at the CFI only.
- the maximum input rating for FSI is 0 to +21mA or 0 to +5.25V.
- do not connect to any of the CFI relay inputs.

Switched Outputs   The CFI provides one programmable switched output terminal.

LABEL	DESCRIPTION
FC, FA, FB	Programmable (N.C., N.O.)

1. Refer to the *Relay Output Parameter Assignment* [B8-8] description in section 3 of this manual for adjustment detail.

The switched output terminals are positioned on the main control terminal block as shown below.

RYO	PSI1	FRUN	RST	EMS	P10	FSV	FSI	COM	FC	FB	FA
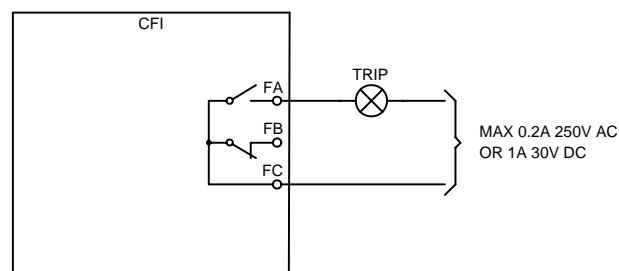
Specification :

- FA, FB, FC : MAX 0.2A 250VAC or 1A 30VDC, 50VA 60W
- control wiring should be run separately from power wiring and should not exceed 50 meters.

**Software
Inputs/Outputs
Overview**

The CFI Series drives provide a range of software inputs and outputs which may be assigned (linked) to the programmable input output terminals, or programmed to be permanently ON or OFF.

= Default Terminal Assignment
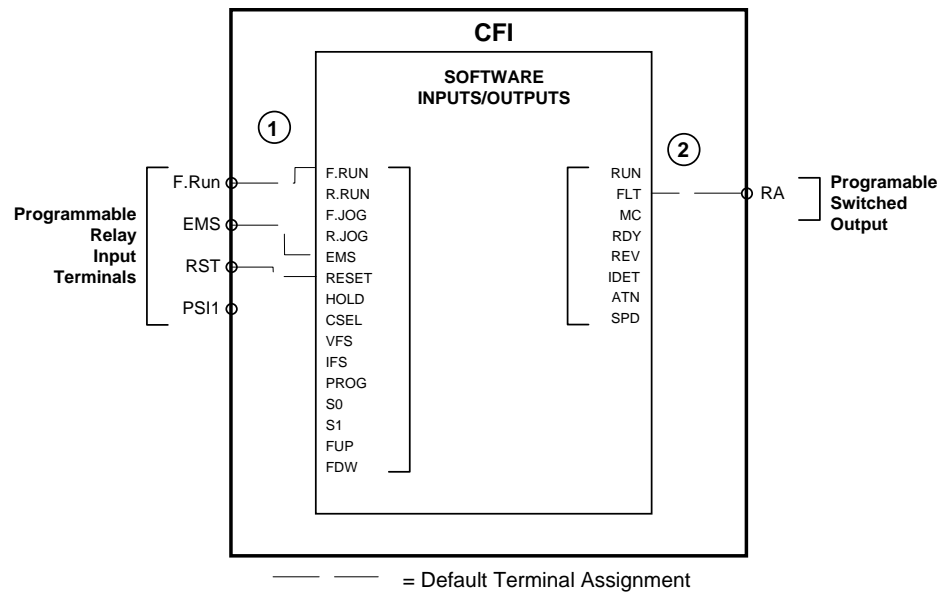
1. Relay Input Terminals are assigned using *Programmable Input Configuration Parameters* [B7-0 thru B8-6]. Refer to Section 3 of this manual for adjustment detail.

2. Switched Output Terminals are assigned using *Relay Output Parameter Assignment* [B8-8]. Refer to Section 3 of this manual for adjustment detail.

Switched Inputs (Software)

The CFI provides the following software control inputs which can be assigned to the Programmable Relay Inputs (F.RUN, RST, EMS, PSI1), or permanently programmed to be ON or OFF.

F.RUN	Run the motor
R.RUN	Run the motor in reverse
F.JOG	Run at jog speed, as set in parameter A0-2/3, in the forward direction. Note that the F.Run and R.Run Command override the F.Jog command.
R.JOG	Run at jog speed, as set in parameter A0-2/3, in the reverse direction. Note that the F.Run and R.Run Command override the F.Jog command.
HOLD	Latch : Cause the F.Run and R.Run software inputs to latch on when closed. Turn the HOLD input off to delatch the F.Run or R.Run and stop the drive.
RST	Resets the CFI
EMS	Initiate an emergency stop, or if already stopped prevent a run condition. The user may specify either a ramp to stop or coast to stop as well as whether a fault condition is activate in the vent of an emergency stop.
VFS	Control motor speed according to the VFS Speed Signal [1]
IFS	Control motor speed according to the IFS Speed Signal [1]
PROG	Control motor speed according to the Multi-step Speed Selector Switch Settings (S0, S1) [1]

S0, S1	Selector Switches For Multi-Step Frequency Settings. When PROG software control input is ON select multi-step speed as follows :
	
	                Prog.0 Prog.1 Prog.2 Prog.3
	   S0 OFF ON OFF ON
	   S1 OFF OFF ON ON

C SEL	Select between Primary Acceleration/Deceleration Rates and Secondary Acceleration/Deceleration Rates. OFF = Primary Acceleration [A1-0] and Deceleration [A1-1] Rates Operative ON = Secondary Acceleration [A1-2] and Deceleration [A1-3] Rates Operative
FUP	Increase motor speed
FDW	Decrease motor speed

1.   If all speed control inputs are on, the speed reference signal is selected with the following priority : PROG > IFS > VFS.

For further detail refer to the ***Programmable Input Configuration Parameters*** [B7-0 thru B8-6] description in Section 3 of this manual.

Switched Outputs (Software)

The CFI provides the following software control outputs which can be assigned to the Programmable Relay Output.

RUN	ON when the CFI is operating
FLT	ON when the CFI has tripped
RDY	ON when the CFI is ready for operation
REV	ON when the CFI has received a reverse run or reverse jog commend. Note that the motor may still be decelerating in the forward direction in response to the reverse command.
I DET	ON when the current exceeds the level set using the ***IDET Current Detect Level*** parameter [A5-1]
ATN	ON when the output frequency has attained the level requested by the speed input signal.
SPD	ON when frequency exceeds the level set using the ***SPD Speed Detect Level*** parameter [A5-2]

**Typical
Connection 1**   The CFI is installed with a Remote Speed Control Station equipped with the
                  following controls :

- Potentiometer Speed Control
- Start/Stop Push Buttons
- Trip Indication Lamp

The following CFI program settings are required for correct operation of the
circuit shown above.

Parameter	Setting	Comment
VFS [B8-0]	9	Turns the Voltage Control Input ON
Run Command Format [B6-0]	3	Configures the CFI for push button control
HOLD [B7-6]	4	Assigns HOLD (latching command) to terminal PSI1
R.RUN [B7-1]	0	As a factory default setting R.Run is assigned to terminal PSI1. This default assignment must be canceled in order to avoid conflict with HOLD function.
F.RUN [B7-0]	3 (default)	Assigns F.RUN (Forward Run command) to terminal F.RUN
Relay Out Parameter Assignment	1 (default)	Assigns FLT (Fault Output) to the CFI Relay Output

**Typical Connection
Drawing 2**
The CFI local control is complemented by automatic control from a PLC. The PLC interface includes :

- 0-10VDC Speed Control Signal
- run signal
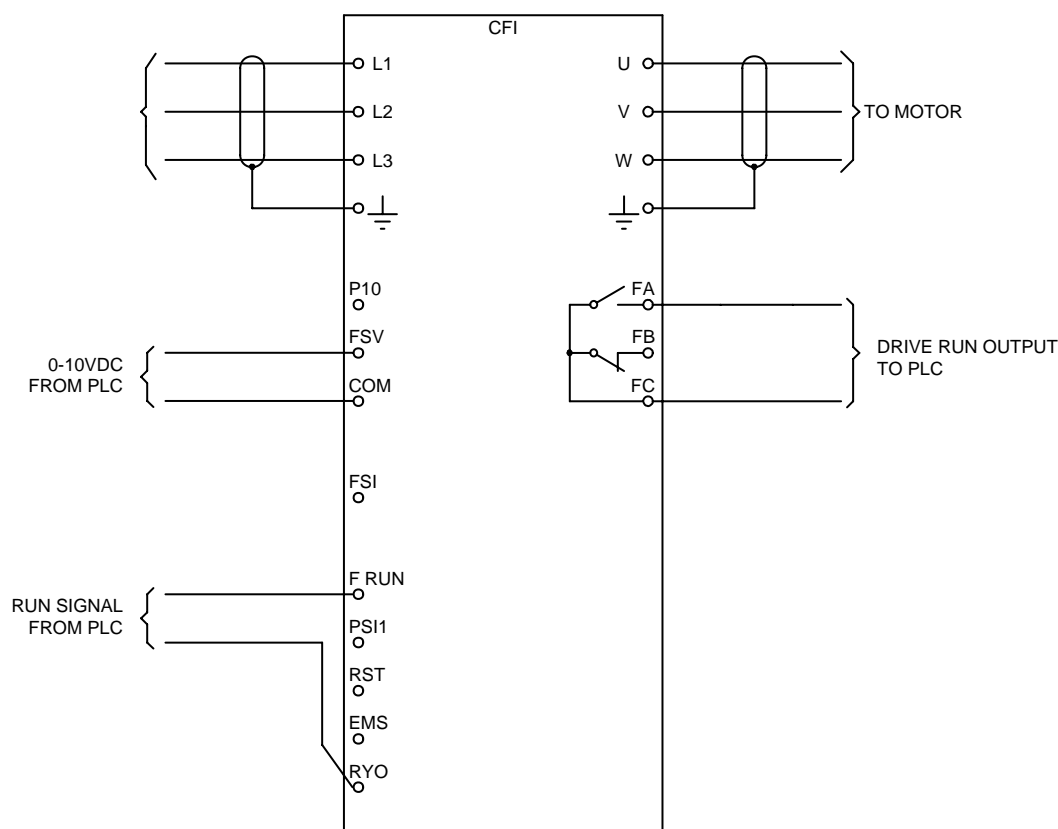
The following CFI program settings are required for correct operation of the circuit shown above.

Parameter	Setting	Comment
VFS [B8-0]	9	Turns the Voltage Control Input ON
Run Command Format [B6-0]	1 (default)	Configures the CFI for a two wire run command
F.RUN [B7-0]	3 (default)	Assigns F.RUN (Forward Run command) to terminal F.RUN
Relay Out Parameter Assignment	0	Assigns RUN (RUN Output) to the CFI Relay Output

Typical Connection Drawing 3

The CFI is applied in a situation where it is required to run under the control of either a Manual Control Station, or an Automatic Speed Signal.

Selecting the manual mode starts the drive and allows the operator to control speed via a potentiometer. In Automatic mode, the motor is started by closing the remote start input (see note 1) and the speed is controlled via the 4-20mA speed signal.
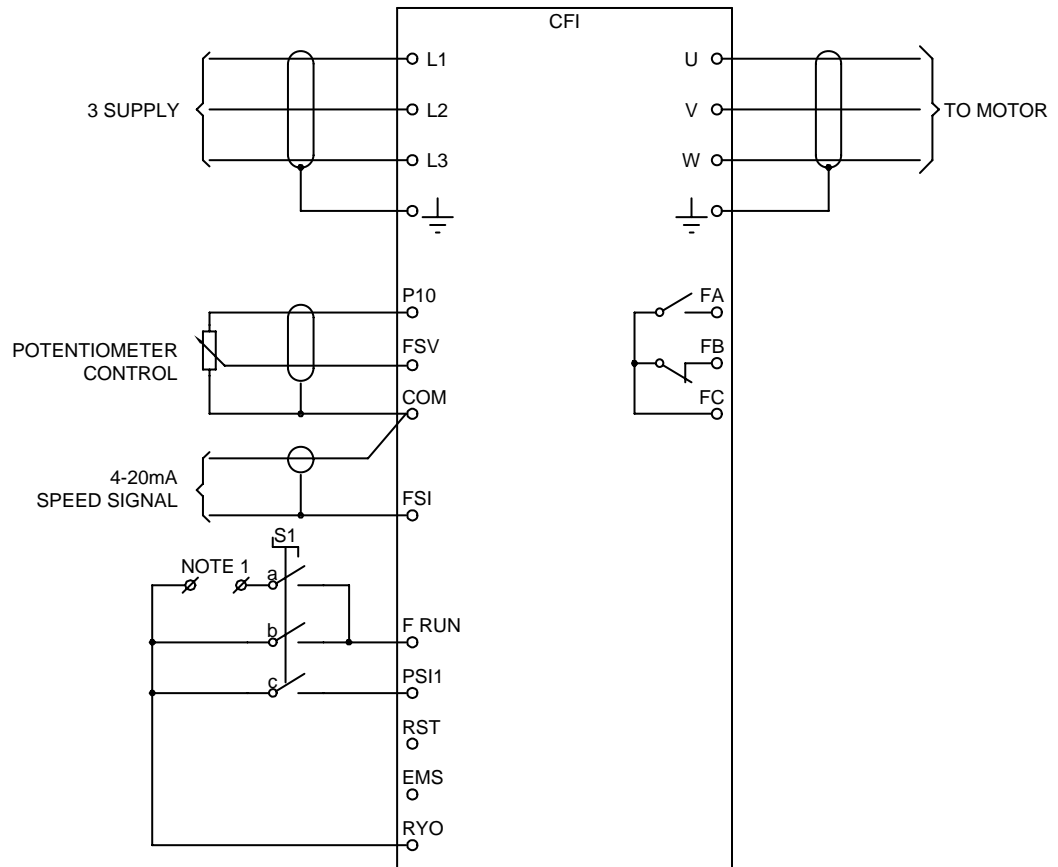
LEGEND	
A1	CFI SPEED DRIVE
S1	MAN-OFF-AUTO
	SELECTOR SWITCH

SWITCH S1 FUNCTION		
X=CLOSED = OPEN		
POLE	MAN OFF	AUTO
a	- -	X
b	X -	-
c	- -	X

NOTE 1

REMOTE START INPUT,CLEAN CONTACT
REQUIRED FOR DRIVE OPERATION

Parameter	Setting	Comment
VFS [B8-0]	9	Turns the Voltage Control ON
IFS [B8-1]	4	Assigns IFS (4-20mA Speed Control) to terminal PSI1.
		Closing the PSI1 input then turns on the 4-20mA Speed Control function ON. Note that Current speed control signals have priority over voltage speed signals, so the potentiometer speed signal is ignored.
Run Command Format [B6-0]	1 (default)	Configures the CFI for a two wire run command
F.RUN [B7-0]	3 (default)	Assigns F.RUN (Forward Run command) to terminal F.RUN

SECTION 8   CFI PROGRAMMING PROCEDURE

Overview : This section provides instruction making program adjustments for the CFI.

**Programming &
Display Panel**
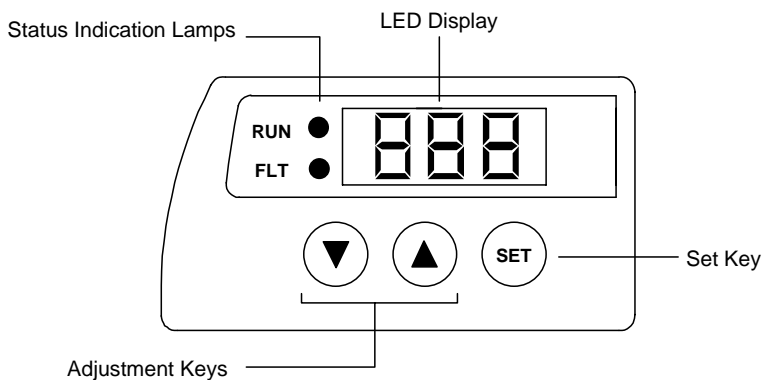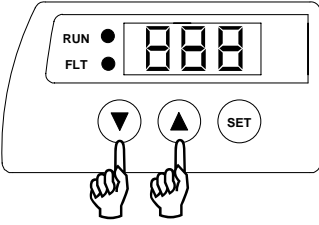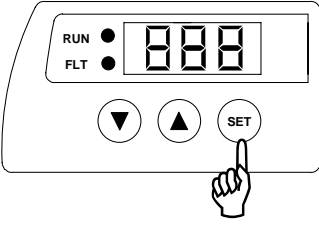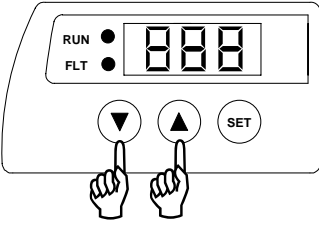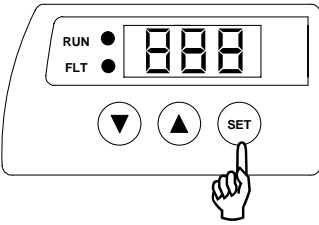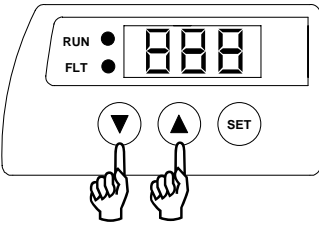
Status Indication Lamps	
Run	Lights when the CFI is running or D.C.Braking
FLT	Lights when the CFI has detected a fault. Reset the CFI by either: 1. Operate the RST input 2. Set parameter B4-0 to any value greater then 0

Adjustment Keys	
▲ ▼	When in the parameter selection mode use these keys to increment or decrement the parameter number. When in the programming mode use these keys to increment or decrement the parameter value.
▲ + SET ▼ + SET	When in the parameter selection mode the "SET" key may be used with the "UP" or "DOWN" keys to step between program groups.

Set Key	
SET	When in parameter selection mode use this key to select the parameter to program. When in program mode use this key to store set value.

**Adjustment
Procedures**   The following steps detail how to program the CFI.

STEP 1		**Scroll through the parameter list to select the desired function.** Press the ▲ or ▼ keys to move to the parameter to be set. On releasing the key the value of the parameter will be displayed. If the ▲ or ▼ keys are held down the CFI will automatically step from function to function, firstly at a slow pace, and after time at an increased speed. Pressing the SET key while holding down either the ▲ or ▼ keys causes a 'jump' to the beginning of the next parameter block. ie A0.0 - A1.0 - A2.0 etc
STEP 2		**Enter the programming mode.** Press the SET key to initiate parameter adjustment mode. The last digit of the current setting will flicker, indicating it can be changed.
STEP 3		**Set the desired parameter value.** Using the ▲ or ▼ keys set the desired parameter value.
STEP 4		**Store the new parameter value.** Press the SET key to store the new value.
STEP 5		**Return To The Desired Display Parameter.** Using the ▲ or ▼ keys return to the desired display parameter. ie M1 thru M6.

SECTION 9   ELECTRICAL SPECIFICATION

Overview : This section details the general electrical specification of the CFI Series Drives.

CFI CONNECTION DETAIL
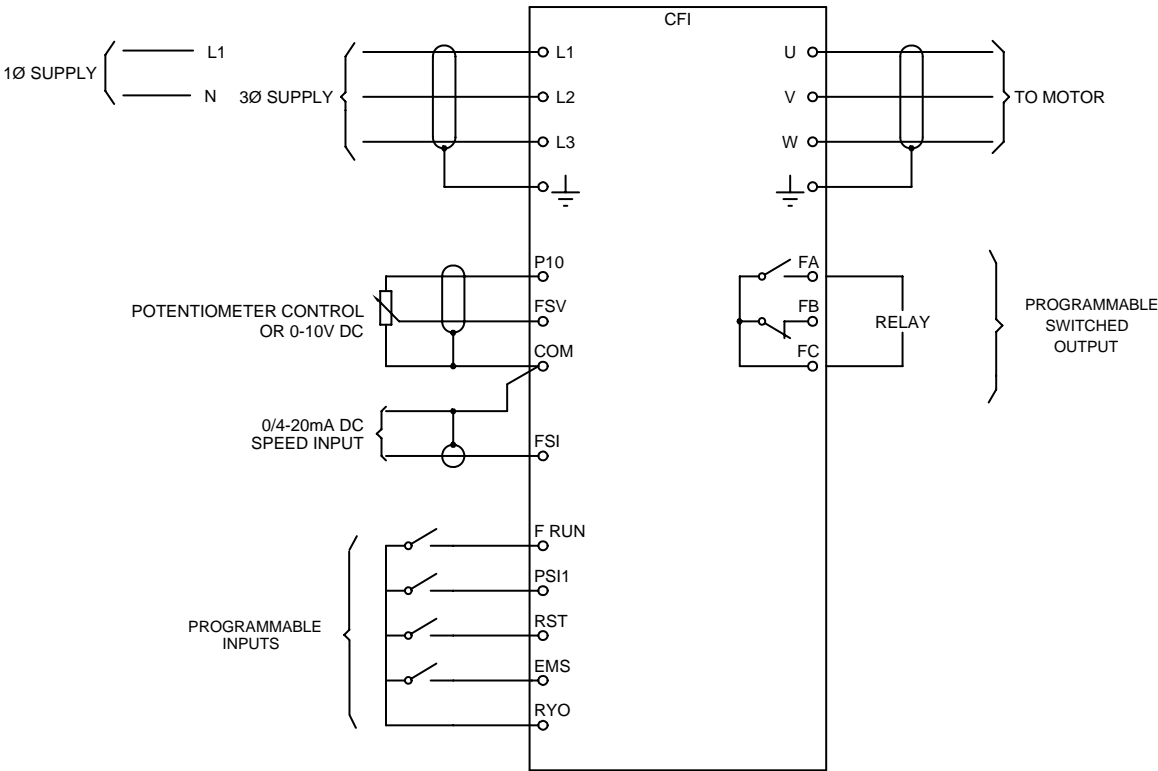
SPECIFICATIONS

POWER CIRCUIT

Control Method	All-digital sinusoidal PWM system	
Input Voltage	Single Phase	3 Phase
	200~240V ± 10%	380~460V ± 10%
Input Frequency	50Hz/60Hz ± 5%	
Output Voltage	Single Phase	3 Phase
	200~240V max	380~460V max
Output Frequency	0.1~440Hz	
Carrier Frequency	3~12kHz (User Adjustable)	
Output Frequency Resolution	0.01 Hz	
Frequency Setting Resolution	Digital Input : 0.01Hz / Analogue Input : 0.1% of max frequency	
Frequency Accuracy	Digital Setting ± 0.01% / Analogue Setting ± 0.5%	

CONTROL

Torque Boost	Automatic or Manual
Acceleration / Deceleration	0.01~3,600 seconds (independently adjustable) - Primary Acceleration/Deceleration Set - Secondary Acceleration/Deceleration Set
Start/Stop Control	Forward Run / Reverse Run Run / Reverse Jog Mode
Stop Modes	Ramp To Stop / Coast To Stop / Emergency Stop
DC Brake	Braking Voltage : 0.1~25% Braking Time : 0.1 ± 20 seconds

OPERATION

Multi-Step Step Control	4 Position
Frequency Limit	Minimum / Maximum Speed Settings
Skip Frequencies	3 Skip Bands
Slip Compensation	User Programmable
Reverse Run Prevention	
Instantaneous Power Failure Restart	

INTERFACE

Local Touch Pad Control Panel	3 Digit, 7 Segment LED Display / 2 LEDs 3 Key Parameter Programming Panel
Control Inputs	4 x Programmable Inputs
Switched Outputs	1 x Programmable Relay (N.C./N.O)]
Remote Speed Input Signals	0 - 10 VDC / 4 - 20mA

PROTECTION

Protection Features	Overcurrent / Overvoltage / Undervoltage / IPM Fault / Motor Overload / Drive Overtemperature / Earth Fault
Trip Log	Last Two Trip States

CURRENT RATINGS

	MODEL	CURRENT (AMPS)	APPROX kW
Single Phase Input	CFI-2030	3.0A	0.4
	CFI-2042	4.2A	0.75
	CFI-2080	8.0A	1.5
	CFI-2110	11.0A	2.2
Three Phase Input	CFI-0025	2.5A	0.75
	CFI-0036	3.6A	1.5
	CFI-0055	5.5A	2.2

SECTION 10   TROUBLE SHOOTING GUIDE

Overview : This section details the CFI diagnostic displays and provides assistance in identifying system faults.

**READ MANUAL COMPLETELY PRIOR TO CONNECTING
AND COMMISSIONING THIS EQUIPMENT**

Fault finding and/or repair of this
equipment must be undertaken only by suitably
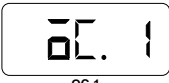qualified personnel.
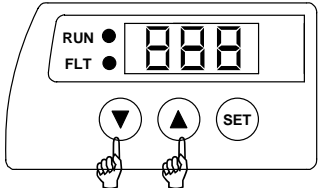
WARNING
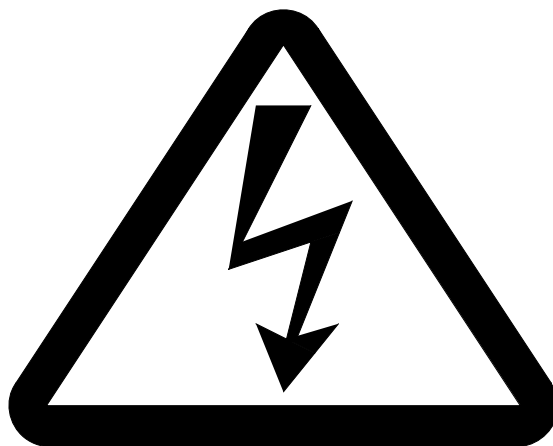
ELECTRICAL SHOCK HAZARD
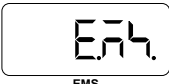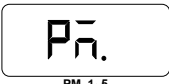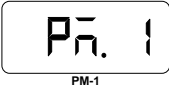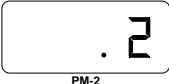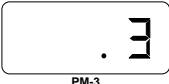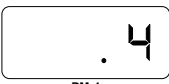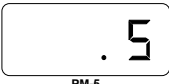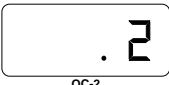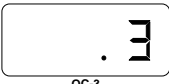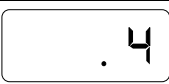
ENSURE THE CFI IS COMPLETELY
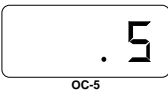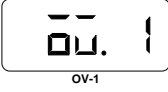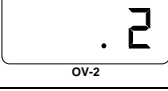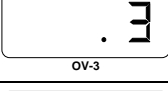## ISOLATED FROM THE POWER SUPPLY BEFORE
ATTEMPTING ANY WORK ON THE UNIT
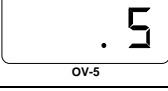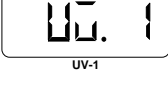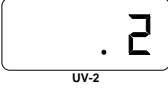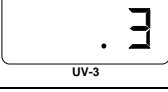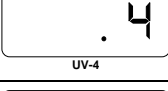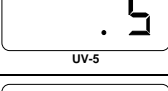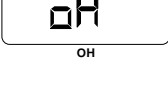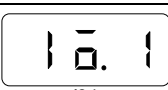
TRIP LOG   The CFI provides a trip log which can show detail of the last two trip states :

STEP 1		Scroll through the Display Parameter List.
	RUN ● � display FLT ● ▼ ▲ SET	Press the ▲ or ▼ keys to move to the desired display parameter (F1 & F2). On releasing the key the fault code will be displayed

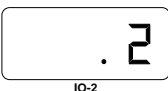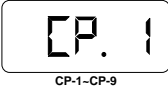## TRIP DISPLAY CODES

DISPLAY	DESCRIPTION/CAUSE	ACTION/TEST
E.П5. EMS	**Emergency Stop**	The EMS software input has been activated and the *EMS Stop Format* Parameter [B6-4] has been set to display a fault in this event.
PП. PM. 1~5	**Power Module**	The IPM protection circuit (overcurrent, short circuit or control voltage drop) has activated. Ensure there is no earth fault in the output wiring or motor and check the fault sub-code below.
PП. 1 PM-1	Power Module - During Stop	Damage to the main power devices may have occurred. Reset and retry.
. 2 PM-2	Power Module - During constant speed operation	A sudden change in the load, or a short circuit may have occurred. Reset and retry
. 3 PM-3	Power Module - During acceleration	1. Increase the acceleration time setting. Adjust, reset and retry. 2. Reduce the torque boost. Adjust, reset and retry. 3. An excess GD^2, short circuit or rapid fluctuation of the load may have occurred. Reset and retry.
. 4 PM-4	Power Module - During deceleration	1. Increase the deceleration time setting. Adjust, reset and retry. 2. A short circuit or rapid fluctuation of the load may have occurred. Reset and retry.
. 5 PM-5	Power Module - During braking	1. Reduce the brake voltage setting (A2-4). Adjust, reset and retry. 2. A short circuit in the load may have occurred.
oC. 1 OC-1	**Overcurrent** - During Stop	Damage to the main power devices may have occurred. Reset and retry.
. 2 OC-2	Overcurrent - During constant speed operation	A sudden change in the load, or a short circuit may have occurred. Reset and retry
. 3 OC-3	Overcurrent - During acceleration	1. Increase the acceleration time setting. Adjust, reset and retry. 2. Reduce the torque boost. Adjust, reset and retry. 3. An excess GD^2, short circuit or rapid fluctuation of the load may have occurred. Reset and retry.
. 4 OC-4	Overcurrent - During deceleration	1. Increase the deceleration time setting. Adjust, reset and retry. 2. A short circuit or rapid fluctuation of the load may have occurred. Reset and retry.

DISPLAY	DESCRIPTION/CAUSE	ACTION/TEST
.5 OC-5	Overcurrent - During braking	1. Reduce the brake voltage setting (A2-4). Adjust, reset and retry. 2. A short circuit in the load may have occurred.
ōu.1 OV-1	**Overvoltage** - During stop	The power supply voltage may have risen. Reduce the voltage within the specified range. Reset and retry.
.2 OV-2	Overvoltage - During constant speed operation	1. The power supply voltage may have risen. Reduce the voltage within the specified range. Reset and retry. 2. A voltage surge may have occurred on the power supply.
.3 OV-3	Overvoltage - During acceleration	1. The power supply voltage may have risen. Reduce the voltage within the specified range. Reset and retry. 2. A voltage surge may have occurred on the power supply.
.4 OV-4	Overvoltage - During deceleration	1. The load GD^2 may be too large. Increase the deceleration time setting. 2. The power supply voltage may have risen. Reduce the voltage within the specified range. Reset and retry.
.5 OV-5	Overvoltage - During braking	The power supply voltage may have risen. Reduce the voltage within the specified range. Reset and retry.
uū.1 UV-1	**Undervoltage** - During stop	A drop in voltage, phase loss or power supply failure may have occurred. Check power supply. Reset and retry.
.2 UV-2	Undervoltage - During constant speed operation	A drop in voltage, phase loss or power supply failure may have occurred. Check power supply. Reset and retry.
.3 UV-3	Undervoltage - During acceleration	A drop in voltage, phase loss or power supply failure may have occurred. Check power supply. Reset and retry.
.4 UV-4	Undervoltage - During deceleration	A drop in voltage, phase loss or power supply failure may have occurred. Check power supply. Reset and retry.
.5 UV-5	Undervoltage - During braking	A drop in voltage, phase loss or power supply failure may have occurred. Check power supply. Reset and retry.
ōH OH	**Overheat**	1. Cooling Fan Failure. Check operation and replace if necessary. 2. Excessive Ambient Temperature. Ensure ambient temperature does not exceed 50°C. 3. The vent or heatsink may be clogged. Ensure air flow is not restricted.
ōL. OL-1	**Overload**	Drive output overload The motor may have overloaded. Reduce the load, or increase the motor and inverter capacity.
Iō.1 IO-1	**I/O error** - gate turnoff circuit error	The CFI may be malfunctioning due to external noise, or faulty control circuitry.
.2 IO-2	I/O error - A/D converter error	The CFI may be malfunctioning due to external noise, or faulty control circuitry.
CP.1 CP-1~CP-9	CPU error	The CFI may be malfunctioning due to external noise, or faulty control circuitry. Turn the power off and on once.

DISPLAY	DESCRIPTION/CAUSE	ACTION/TEST
EA. n EA.n	Parameter Error in Group A	1. A parameter setting value is incorrect. 2. "n" indicates the parameter group number. i.e. If there is an error at A2-3, "EA.2" will be displayed. 3. Search the identified parameter group for the incorrect parameter and correct the setting. Data for the incorrectly set value will be shown as "--".
Eb. n EB.n	Parameter Error in Group B	1. A parameter setting value is incorrect. 2. indicates the parameter group number. i.e. If there is an error at B2-3, "BA.2" will be displayed. 3. Search the identified parameter group for the incorrect parameter and correct the setting. Data for the incorrectly set value will be shown as "--".

SYMPTOM	CAUSE/ACTION/TEST
Motor Does Not Run	1. The Input/Output wiring may be incorrect check wiring 2. A phase or power failure may have occurred, check the power supply. 3. The motor may be locked, or the load to heavy. Check the motor and load.
Motor Runs In Wrong Direction	1. The output terminal (U, V and W) sequence may be incorrect. Exchange the phase sequence. 2. The control circuitry to the CFI F.Run, R.Run, F.Jog or R.Jog terminals may be incorrect. Check the control circuitry.
Motor Runs, But The Speed Does Not Vary	1. The load may be too heavy. Reduce the load. 2. The speed input signal may be incorrect. Check the speed input signal circuit and ensure that the appropriate CFI software control inputs are on.
Motor Acceleration / Deceleration Is Not Smooth	1. The motor acceleration / deceleration time settings may be too low. Increase the settings
Motor Speed Varies During Constant Speed Operation	1. The load may be fluctuating excessively or the load is too heavy. Reduce the load or fluctuation. 2. The inverter/motor ratings may not match the load. Select an inverter/motor combination that matches the load. 3. If instability still exists try the following - Lower the carrier frequency (B9-3) - Increase Torque Boost Voltage - Increase the load torque - Increase GD^2
Motor Speed Is Too High Or Too Low	1. The number of motor poles, or voltage may be incorrect. Check the motor specifications. 2. The *Maximum Frequency* [B9-0] may be set incorrectly. Check setting. 3. The *Supply Frequency* [B9-1] may be set incorrectly. Check the setting. 4. The motor terminal voltage may be low. Measure motor terminal voltage and install larger output cabling if necessary.